



SATURDAY, JULY 18, 1874.

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CATECHISM OF THE LOCOMOTIVE.

By M. N. FORNEY, Mechanical Engineer.

PART XL. (CONTINUED.)

THE RUNNING GEAR.

QUESTION 284. How can we find by calculation the elasticity or deflection of a given steel spring?

Answer. By multiplying the breadth of the plates in inches by the cube of the thickness in sixteenths, and by the number of plates; divide the cube of the span in inches by the span; the span is the distance between the centers of the spring-hangers when the spring is loaded.

product so found, and multiply by 1.66. The result is the elasticity in sixteenths of an inch per ton of load.

QUESTION 285. How can we find the span due to a given elasticity and number and size of plates?

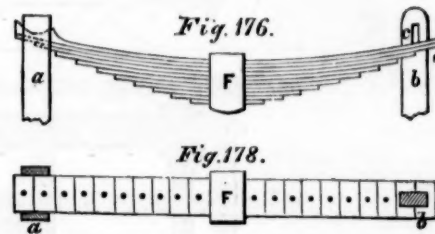
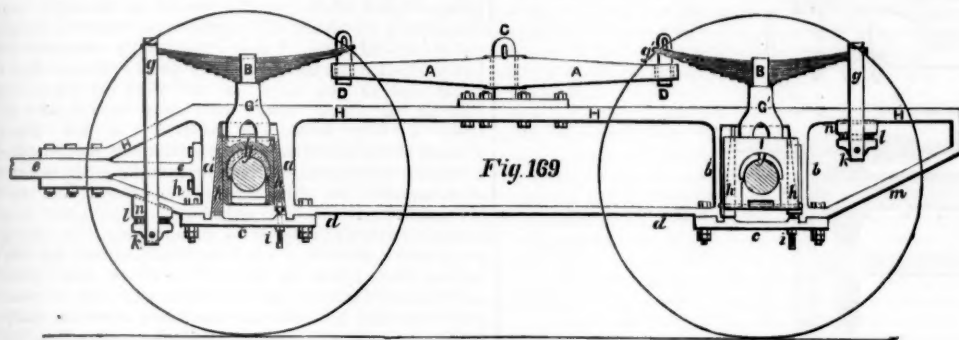
Answer. By multiplying the elasticity in sixteenths per ton by the breadth of plate in inches, and by the cube of the thickness in sixteenths, and by the number of plates: divide

Answer. The front hanger, *g*, fig. 169, of the front spring, and the back hanger, *g*, of the back spring have eyes and pins in their lower ends, *k*, as shown in the engraving. The pins are supported by rubber springs, *l*, *l*, which are held between two concave castings, *n*, *k*, one of each of which rests against the frames. The object of the rubber springs is to relieve the spring-hangers from sudden shocks and strains. The benefit derived from their use is believed to be purely imaginary, as the spring itself, if sufficiently elastic, should absorb the sudden shocks which the wheels and axles will convey to the hangers.

QUESTION 293. Why are the ends *g'*, *g'* of the springs attached to the lever *A*, *A*?

Answer. Because if there is a spring for every axle and the hangers are fastened to the frame, then evidently the locomotive has as many points of support as it has axle-boxes. Every shock from the rails is transferred through the wheel and the axle to the nearest axle-box and the spring belonging to it, and the latter must be made strong enough to receive and dispose of the whole of it. If the adjacent hangers, *g'*, *g'*, fig. 169, of the adjoining springs, *B* and *B'*, are connected by an equalizing lever, *A*, *A*, which turns on the fixed point *C*, then the shock which affects one wheel will be transferred first to the corresponding spring. This itself and with it the hangers will be more powerfully affected and thus will the equalizer be inclined obliquely and will transfer a part of the pressure to the adjoining spring. If by some unevenness of the road or a powerful oscillation of the locomotive, on the other hand, a spring is momentarily burdened, the equalizer likewise causes

center from the middle, *a*, of a long spring, *D*, *E*, the ends of which rest on two supports, *F* and *G*, it is evident that if the point of suspension is at the middle of the timber and the spring, the weight of the timber will rest equally on the two supports, *F* and *G*, and that the ends of the timber can move up or down or vibrate about the point of suspension, *C*, without affecting the distribution of weight on the supports, *F* and *G*. If, now, the timber is suspended from three points, *A*, *B* and *C*, that is, its middle and two ends, as shown in fig. 185, the ends, *A* and *B*, being attached to the ends of the springs *b* *c* and *d* *e*, the latter resting on the supports *F* and *G* and connected at their opposite ends to an equalizer, *f* *g*, whose fulcrum is at *a*, it is evident that each of the end hangers must support one-half the weight of the timber between the ends and the middle, and that the center hanger must support one-half the weight between the middle and the two ends; in other words, the end hangers would each sustain one-fourth of the weight of the timber and the middle one one-half of its weight. If the weight of the timber is 1,000 pounds, the end hangers would each sustain 250 and the middle one 500 pounds. The weight of the middle of the timber is hung on the equalizer, and one-half, or 250 pounds, of it is thus transferred to each of its ends and thence to the hangers *f* *c* and *g* *d*, and thus to the springs, so that each end of the spring sustains a weight of 250 pounds, or in other words, it bears a total load of 500 pounds, or one-half of the weight of the timber, which is the same load the two supports *F* and *G* carried in fig. 164. If the ends of a timber



by 1.66, and find the cube root of the quotient. The result is the span in inches.

QUESTION 286. How can we find the number of plates due to a given elasticity, span, and size of plate?

Answer. By multiplying the cube of the span in inches by 1.66; then multiplying the elasticity in sixteenths by the breadth of plate in inches, and by the cube of the thickness in sixteenths; divide the former product by the latter. The quotient is the number of plates.

QUESTION 287. How can we find the working strength, that is the greatest weight it should bear in practice, of a given steel spring?

Answer. By multiplying the breadth of plates in inches by the square of the thickness in sixteenths, and by the number of plates; multiply, also, the working span in inches by 11.3; divide the former product by the latter. The result is the working strength in tons (of 2,240 pounds) burden.

QUESTION 288. How can we find the span due to a given strength, and number and size of plate?

Answer. By multiplying the breadth of plate in inches by the square of the thickness in sixteenths, and by the number of plates; multiply, also, the strength in tons by 11.3; divide the former product by the latter. The result is the working span in inches.

QUESTION 289. How can we find the number of plates due to a given strength, span and size of plates?

Answer. By multiplying the strength in tons by the span in inches, and by 11.3; multiply, also, the breadth of plate in inches by the square of the thickness in sixteenths; divide the former product by the latter. The result is the number of plates.

QUESTION 290. How can we find the required amount of curvature or set of the spring before it is loaded?

Answer. By multiplying the elasticity, in inches, per ton, by the working strength in tons; add the product to the desired working compass. The sum is the whole original set, to which an allowance of $\frac{1}{8}$ to $\frac{1}{4}$ in. should be added to the permanent setting of the spring.

QUESTION 291. How are the spring-hangers attached to the ends of the springs?

Answer. A great variety of methods have been used. The most common ones are those shown in fig. 169. There the hanger embraces the spring at the ends, *g*, *g*, (shown on an enlarged scale in figs. 176 and 178). The end of the spring has two projections forged on its end to receive the upper end of the hanger, which is made to fit the groove thus formed between the two projections. At the other end, *b*, of the spring, figs. 176 and 178, has an eye cut in it which receives the hanger *b*. The latter is made of a single bar, and also has an eye, *c*, to receive a key which sustains the weight suspended on the hanger *b*. The back end of the front springs and the front end of the back springs are made in this way because they come on the side of the fire-box, and if their width was increased by the thickness of the hanger, as shown at *a* in fig. 178, it would rub against and wear the outer shell of the fire-box.

QUESTION 292. How are the lower ends of the hangers attached?

Answer. The following rules for calculating the proportion and strength of steel springs are from Clark's Railway Machinery.

the next wheel to receive part of this load.

The advantages of this arrangement are evident: since the springs have to receive only a part of the shocks, they can be made less strong and therefore more flexible. The danger of running off the track and that of breaking axles, springs and hangers are reduced by the use of equalizing levers.

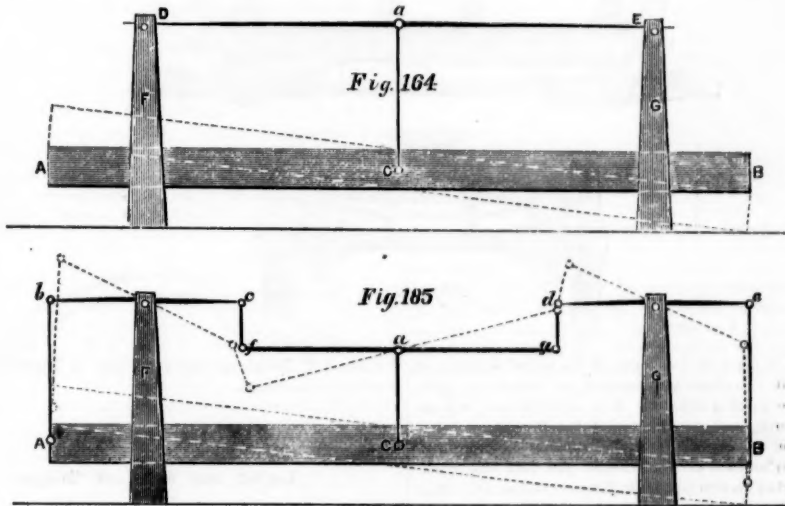
QUESTION 294. How are the equalizing levers constructed?

Answer. They are made of wrought iron and are supported in the center by a fulcrum, *C*, which is fastened to the frame or boiler or both. The spring hangers *g'*, *g'* are attached to the lever by eyes and keys. Sometimes eyes are made in the lever, as shown in fig. 169, and the hanger is inserted into the eye with either a key or else with projections which are forged on the hanger below the lever. In other cases the hangers are made with an eye which embraces the end of the lever.

QUESTION 295. How is the distribution of weight of the engine affected by the equalizing levers?

Answer. The weight is equally distributed on all the driving-wheels. This is apparent if it is observed that the weight suspended from each of the spring hangers of each spring in fig. 169 must be the same; for if the weights in the two hangers, *g'* and *g'*, were unequal, then the end of the spring which supports the heaviest weight would be drawn down until the pressure was equalized. If the weights suspended from the two hangers, *g'* and *g'*, attached to the equalizing lever were unequal, then the one supporting the greatest load would draw up its end of the equalizer until the weights were again in equilibrium.

Another effect of the equalizing levers is that each side of the locomotive is supported in such a way that the action is the same as it would be if it was supported on one point. If, for example, we have a heavy beam, say a piece of timber like that shown by *A*, *B*, fig. 164, suspended at one point, *c*, in the



supported as shown in fig. 185 are moved up or down about the center point of suspension, it is evident that the distribution of weight would not be affected any more than it was in fig. 164 by a similar movement, because if the ends of the timber move as shown by the dotted lines around the center point of suspension, the end *A* will ascend as much as *B* descends. The same thing is true of the ends *b* and *c* of the springs and of their opposite ends *e* and *d*, and also of the ends of the equalizer, so that when the timber, springs and equalizer are in the position shown by the dotted lines, it is in equilibrium, just as it was when the timber was horizontal; and therefore the weight on the supports is the same in both cases, thus showing that the load *A*, *B* can move about the center of suspension when supported as shown in fig. 185 as freely as it can if arranged as shown in fig. 164. It therefore follows that in the distribution of the weight of each side of the locomotive on the wheels and on the track, it may be regarded the same as though it was supported at one point, which is the fulcrum of the equalizing-lever.

QUESTION 296. What advantage results from supporting the weight of the back part of the locomotive on two points?

Answer. If the back part of the locomotive rests on only two points and the front end on the center of the track, then the whole weight of the engine will be sustained on three points. Now it is a well known fact that any tripod, like that on which an engineer's level is mounted, or a three-legged stool, will adjust itself to any surface, however uneven, and stand firmly in any position; whereas if there are more than three points of support, if they are all of the same length the surface on which they rest must be a plane, otherwise some of them will not touch. All railroad tracks have inequalities of surface, and therefore it is of the utmost importance that a locomotive should be able to adjust itself on its points of support to any unevenness of the track on which it must run.

† This lever is called an equalizing lever or beam, or, more briefly, an equalizer.

This is possible only when the weight rests on three points of support.

QUESTION 297. How is the truck constructed?

Answer. It consists, as has already been stated, of two pairs of wheels. These are attached to a frame, *N H*, figs. 40, 41 and 42. The axles have boxes called *truck-boxes*, and brass bearings similar to those used on the driving-axes. These boxes work in jaws, also similar to those on the main engine frame, excepting that they have no attachment to prevent them from being worn by the motion of the boxes up and down in the jaws. Fig. 186 is a horizontal section, fig. 187 a plan, and fig. 188 a transverse section of a truck. The frame, *N H*, fig. 187, is of rectangular form and is forged in one piece. The legs, *ff*, which form the jaws for the boxes, are bolted to the frame as shown in fig. 186. To the lower end of these legs a brace, *g g*, is bolted, which thus unites them together. On each side one spring, *SFS*, is placed under the frame and in the reverse or inverted position to that of the driving-springs. Two equalizing levers, *G G*, are placed on each side of the truck, one of them on the inside of the frame and the other on the outside, as shown in the plan. The ends of these equalizers rest on the top of the truck-boxes, and the springs are attached to the levers at *i i* by the hangers, *jj*. The truck-frame rests on the top of the spring-

"jumping" off of the track on a rough track or in case of accident. The annular groove and the projection which fits into it are intended to receive the strain which otherwise would bear against the center-pin and would be liable to break or bend it.

From this description it will be seen that while the truck frame rests on two points, *k k*, the weight of the engine is supported by the center-plate of the truck. As the back part substantially rests on the centers of the two equalizers, it will be seen that this distribution of the weight fulfills the conditions of the tripod, or, as it has been called, the "three-legged principle."

QUESTION 298. How is a truck arranged so as to give it lateral motion?

Answer. The lower center-plate is usually suspended in some way from the truck-frame on links or hangers, so that it can swing laterally. One method of doing this is shown in figs. 189, 190 and 191. Fig. 190 is a front view, fig. 191 a plan, and fig. 189 a transverse section of such an arrangement. The center-plate *HH* has cast with it an extension, *B B*, the ends of which are suspended on links, *L L*, called *suspension-links*, the upper ends of which are attached to bars, *m m*, which are set edgewise and extend across the truck-frames. It is evident that with this arrangement the lower center casting can swing crosswise of the track on the links *L L*, and that the

I may say in this connection that Captain Tyler, who was sent out by the English stockholders to examine the structure and who tested the deflection of the bridge under the first load that was placed on it, could hardly credit his senses, and it was only after the strongest assurances that he could be made to believe the structure had not been loaded before. He expected to find at least double the deflection that actually took place, and also to find a considerable amount of permanent deflection, while, in fact, he could not find any. Both these results being so entirely different from his previous experience and observation, which had been very extensive, he could not himself account for the fact in any other way than he knew it had frequently been done in England; but when he had thoroughly examined and had explained to him the details of construction, he was thoroughly satisfied that the structure was built upon sound principles theoretically and practically, and I am informed that Captain Tyler is an authority in such matters not to be doubted in England. With your permission I will now read the article of Mr. Matheson. [Read article headed "English versus American Bridges," in April 4, 1874, issue of the RAILROAD GAZETTE.]

He speaks of the solid floor systems as practiced in England, properly calling them luxuries, and I wish he had made the subject a more prominent part of his communication, for I consider them very important for safety.

I desire to take some exceptions to his communication, as I presume statements that have been made by myself have had their influence in bringing out these criticisms.

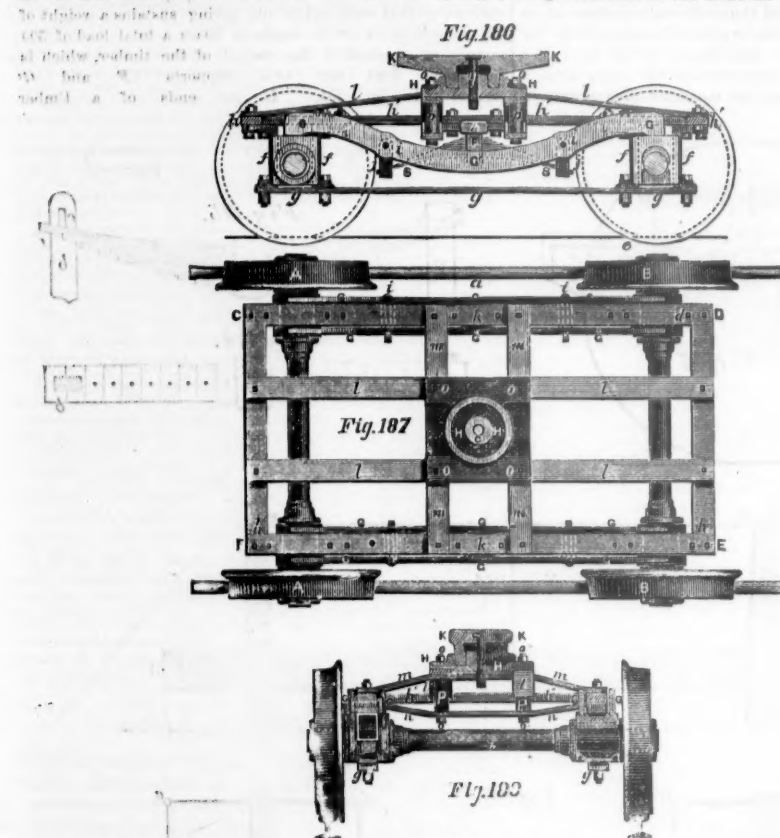
Since this was written a translation of a discussion which originally appeared in Berlin by Charles Boudier, C. E., has been published, which gives the views of one thoroughly conversant with the history and practice of the science in Europe and the United States. I have consequently condensed my own production and taken out some parts entire so that I might read to you some of the views of others as well as my own within the short time I have to cover a wide extent of surface. I had hoped to speak to you somewhat in detail concerning the selection of suitable material, the different forms for the different parts of the structure, the action of metal under various and varying strains, the results of experiments made by myself in a machine of sufficient capacity to rupture large bars used in actual practice instead of small specimens, so that not only the laws which govern the behavior of metals under strain are determined but also the constants applicable to actual work; but I must leave this very fascinating as well as equally important branch of the subject till another opportunity.

He speaks of the objection to making short span bridges light and thinks dead weight should be introduced to lessen vibration or "anchor" the bridge. I understand him to admit that English bridges, though they have much more material in them than American bridges, do deflect more under a passing or static load. Now if the bridge recovers its original level after the load is removed, supposing it to be a very swift train, would not there be more jump than from a less deflection? I would like very much to know if any one has ever observed or measured the jump of bridges above the original level. If you assume a train speed of 60 miles per hour, a 50 feet span and a deflection of $\frac{1}{4}$ inch—which is in excess of what will be obtained in a first-class built American bridge—no greater jump could be obtained than from a single engine moving backwards. This would require a little more than $\frac{1}{2}$ second to remove the deflection, the mean velocity being $\frac{1}{2}$ inch per second, which could not produce very serious results; not so much occasion for it as in English bridges, on account of less deflection and the fact that counterbracing is much more perfect in American bridges; being adjustable also has an effect to prevent it, should there be any tendency towards it.

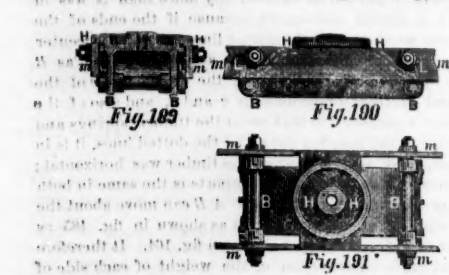
Do not understand me to be an advocate of light built bridges, but simply comparing the best built of the two systems; for I will go as far towards building bridges stronger (not heavier) as it can be shown to be a profitable investment of labor and material; to go further would be a waste of the country's resources, as much so as if it were burned. If the amount of material which an English engineer would put into a structure is no more than is a good investment, and I do not deny it, then I say put it in, but put it in such shape that it will be of some use to sustain load, or, more properly speaking, resist strains produced by load, and not be mere dead weight. Dead weight may be used to retain the equilibrium and reduce undulation under concentrated moving loads, but much less material would accomplish the same and better results as counterbracing.

Mr. Matheson seems to indicate that though pin connections are used in England and "hinged joints transmit the strain centrally under all conditions of the structure," still riveted work is desired, i. e., the connection confessedly demanding the greater skill and care is thought best in which any deflection somewhat distorting the shape of the panels brings an immense leverage to shear the rivets, and this to the extent as to cause motion readily seen between the different members forming the joint after having been in use for a few years in English-built lattice bridges.

This distortion is necessarily very much increased by lattice riveted construction, because the members are not adjustable in length, and therefore when the bridge is set up the counters are slack and the movement of a concentrated load causes an undulation magnifying the distortion before mentioned and causing the shearing strain on the rivets practically very injurious to the durability of the structure, and I must differ from him in the statement that "struts connected to the main flanges by groups of rivets are stiffer to resist bending sideways than are struts held only by hinged pin joints," for the reason that there is no tendency in the pin joints other than also exists in the riveted, viz.: weight of the strut itself, vibration and the bending strains necessarily in all struts, to force it out of line, while with the riveted at the time the



strap, *F*, which is made of the form of an arc of a circle; or "rounded," as it is termed by workmen, so that it can move freely about the point of support. It is evident that this arrangement of spring and equalizer operates the same as that employed for the driving-wheels in distributing the weight of the truck equally on each of the wheels, and that the truck-frame is supported on two points, *k k*, figs. 186 and 187. The weight of the front end of the engine rests on a cast-iron center-plate, *H H*. This center-plate rests on four bars, *ll*, *l l* and *m m*, two of which are bolted to the frame transversely and the other two longitudinally, as shown



in the plan. These bars are elevated in the center as shown in figs. 186 and 188. The transverse bars are trussed with two corresponding bars, *n n*, fig. 188, below. These *truss-bars*, as they are called, are bolted to the upper bars with bolts, *o o*, but are separated from the top bars by distance pieces, *P P*, figs. 186 and 188. The center-plate *H H*, called the *lower center-plate*, has an annular groove in it, which receives a corresponding projection on the casting *K K*, called the *upper center-plate*, which is bolted to the bed-plate of the cylinders, as shown in fig. 41. The upper center-plate has a pin *Y*, called a *center-pin*, figs. 188 and 41, attached to it, which passes through the lower center-plate, and has a key underneath the latter plate. This key is intended to prevent the engine from

front end of the engine will thus have a lateral motion independent of the truck.

Contributions.

English and American Bridges.

[Read before the Boston Society of Ar's, May 14, 1874, by E. H. HEWINS, C. E.]

In speaking to you this evening upon "English and American Bridges," it is not my purpose to present to you discussions or statements with any attempt at completeness concerning the requirements and practices of iron bridge building. That would require more time than could be given in many evenings, even if I had the ability to expound the principles and laws which govern this extensive subject, but I will for the present confine myself to the discussion of some of the more salient points of difference between the two systems, and may, perhaps, in consequence, leave some points partially unexplained, though they might be interesting and instructive in their discussion and study.

I find in the RAILROAD GAZETTE of April 4, 1874, an article written by Mr. Ewing Matheson, C. E., of London, in which he discusses the relative merits of the methods of building iron bridges as practiced in this country and in England. I am very glad the article has been written in defence of the English methods, and I recognize in it a spirit of fairness which in the United States we hardly expect to see in Englishmen, and it is a satisfaction to me to find my preconceived ideas in this respect, to some extent at least, in the wrong. The discussion that will be brought out will, I trust, be of practical benefit in the correction of whatever misunderstandings there may have been on both sides, and stimulate the diffusion of knowledge concerning the best and most approved constructions.

At the commencement of the article just mentioned he speaks of an article published in the January 10, 1874, issue of the same publication, giving some facts regarding the building of the International Bridge, and as he quotes only one clause from the article, I will read from it, with your permission, more at length. [Read in RAILROAD GAZETTE, January 10, 1874, commencing at "it may be of interest," &c., and finished the article.]

In some rare cases three pairs of wheels are employed for locomotive trucks. Six-wheeled trucks are very commonly used under passenger cars.

The right half is a section through the center of the truck, or *o o* of fig. 186, and the left half a section through the center of the axle-box.

greatest strain is exerted on the strut the distortion is large, and the very rigidity of the riveted joints brings a bending strain on the strut, which must either bend or the rivets be sheared; and I understand that such bridges require constant care and attention to replace rivets broken or loosened by this constant action.

Neither can I agree with him concerning the hammering of pins in their holes, even if they should be made quite free. The pin might be flattened, but I think no pounding. He may, however, have reference to the Warren girder type, which I understand to be quite a favorite with Englishmen. I get this impression from seeing it quite often illustrated in *Engineering*. While this form of truss can be built with extreme economy of material to sustain a specified load, American engineers show a desire to build permanent structures even at additional expense, and seldom build a structure in whose members the strains are alternately tensile and compressive, but endeavor to so design the structure that the strains to which any one member may be subjected under all the varying circumstances shall be either tensile or compressive, and it is also an object for which Americans spend money to make the variation between the maximum and minimum strains as little as possible; experiments on impact and the fatigue of metals going to show that the life of a member is much longer the less the variation.

The case of the Crumlin Viaduct is one which can hardly be quoted as an argument against pin and eye connections, for the reason that the best principles can be entirely spoiled by want of faithfulness in details, and we consider in this country that an engineer who would make the proportions the same does not understand the first elements of iron bridge construction, and that the ignorance displayed in the proportioning of the parts was only equalled by the rejection of the principle, because the parts had not a sufficient area or were not properly arranged in detail.

Rust is undoubtedly a serious question, and iron bridges have been built for a sufficiently long time to demonstrate this fact and especially in that class of bridges which we at present designate as English, though the same construction is generally used on the Continent. The tubular bridges cannot be painted inside the cells after being put together, and I am told that the amount of rust that has been taken from the Victoria Bridge is enormous. Mr. Matheson in his paper does not so state, but leaves the decided impression that rust is more likely to take place in American bridges than in English. Now American bridges are usually either accessible at every part to the paint brush except the pins, or the parts that cannot be reached are sealed nearly if not quite air-tight, so that there can be no change and consequently no moisture within them except such as may be contained in the air at the time, and pins have been found to be unaffected after years of use where a not excessive care has been taken to keep the outside protected, but all the parts are better than the English—and Mr. Matheson seems to neglect or disregard this point—because the material being all concentrated along the lines of strain, there is the least amount of surface per unit of section, and though the bridge may be much lighter yet it has less surface exposed to oxidation in proportion to its weight.

It will therefore be seen that the American engineer also has for his object a structure "to last a very long time, even at the expense of first cost;" a deep truss bridge with a positive system of tie rods, pins, nuts and struts is designed, and its strength is proved to demonstration most satisfactorily on paper. The theoretical strains are confirmed by the manner in which the bridge stands the test load; owing to the depth of the girders the deflection is very small, etc. That bridge will withstand sudden shocks of trains moving at any speed, because it is proportioned to carry a load of say 3,000 pounds per lineal foot of track when not more than 2,000 pounds can be got upon it by any legitimate means, which load strains the iron in tension 10,000 pounds per square inch, the elastic limit being about 30,000 pounds, and other tests showing the iron to be tough and ductile, the compression members being strained proportionally. It will stand better than the English bridge because it will have less deflection, the disruptive forces at the joints being less in proportion as the deflection is less, and even these very largely provided for; it will stand the unequal loading better because the counters are ready to do their work and prevent undulation and distortion of form, which action is particularly destructive to the English construction, and it is "likely, therefore, after 20 years of railroad life and incident," to exhibit a better condition and fitness for the future.

It is unfortunately true that some bridge-builders in this country do make bridges to sell, without much regard to quality; but we are now supposed to have been considering the American type of bridge-building, its peculiarities of construction as made by first-class builders, as compared with the same class of English constructions. Those who are building bridges "to sell" are doing an immense amount of injury, and I can, in consequence, see at a not very distant day a system of Government inspection similar to that in England. The rigid and faithful enforcement of requirements such as the best builders exercise voluntarily would hasten the day which the gentleman thinks will never be seen, and we should all learn something—the Englishman to economize, which is, to build a better structure for the same money; and the American to provide against danger from accident, which is to save money and lives by building tight floors and parapets, or some other and comparatively cheap device for accomplishing the same result. Then we should have almost perfection, if it were human nature to allow man to be satisfied to remain where and as he is for a short time, instead of a feverish desire for something better and constant restlessness, which results in and causes upward and onward progress in the paths of science, and the study into the laws by which we have our existence, and the adaptation of our surroundings to the benefit of mankind.

The Action of the Bourdon Gauge.

ST. LOUIS, MO., April 16, 1874.

TO THE EDITOR OF THE RAILROAD GAZETTE:

As I cannot agree with the remarks made under the head of "Boiler Attachments" in your paper of 11th inst., wherein it is stated that the reason for the action of the Bourdon gauge bent tube is due to the pressure of steam being greater on the outer than on the inner curve of the tube, I address these remarks in hopes to give a more satisfactory explanation.

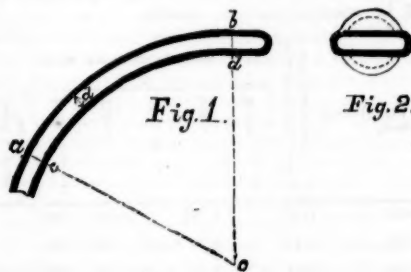
The above method of explaining the motion of this tube under pressure, though repeated time and again, is directly at variance with well-established laws of aerostatics or hydraulics. The pressure of a liquid or gas upon a curved surface in any one direction is always proportional to the projected area of the surface in the same direction. Motion cannot take place in any body or system of bodies in a certain direction unless the resultant of all the forces acting on the bodies in that direction be greater than zero. Now, if the ends of this tube move outward owing to a greater pressure on the outside curve, the sum of the forces acting on this outward surface, projected in some one direction, must be greater than that on the inner surface, projected in the same direction. But the projection of these two surfaces in any direction will be equal, and the pressures perpendicular to this direction, being the same per square inch of projected surface, will be equal and opposite. This, therefore, cannot explain the action of this tube.

The additional illustration used, of a fire-engine hose, is equally fallacious, for this is an open tube with a liquid stream in motion through it. This can be readily explained by the mechanical axiom that all bodies put in motion by a single force follow straight lines, and can only be given a curvilinear direction by introducing other forces or resistances (i. e., the two men mentioned as necessary to handle the discharge pipe of the hose).

It is well known that when a bent steam or water pipe (under pressure) breaks or is opened at the end, it immediately tends to straighten itself out; but as long as the ends of the pipes are closed no pressure, however great, will straighten the pipes if they be of a circular section.

I have applied a pressure of 5,000 pounds per square inch to a three-quarter-inch hydraulic pipe bent into several sharp curves, the end being closed but free to move, without producing any straightening action (on hydraulic balancing arrangement of the Illinois & St. Louis Bridge towers, during the erection of the bridge). In 1867, at the Naval Academy, a similar experiment was tried under my supervision, by carefully laying out a small quarter-inch rubber tube over an exact circle of twenty feet diameter, and applying by means of a force pump a pressure of over 100 pounds per square inch. As long as the end of the tube remained closed, no change of curvature was produced. At the same time and place I had made a bent tube of the same form as a Bourdon tube, excepting the cross section (see fig. 3), which curled inwardly by application of an internal pressure. Now no explanation can be accepted as the true one which does not apply to all forms of cross section of tube.

The following explanation will apply to all the different cases. Let fig. 1 represent a section of a bent tube in the



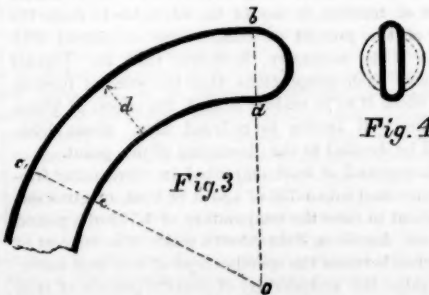
direction of its length, and fig. 2 the cross section of the same—this being the form of a common Bourdon gauge tube. O is the center of the curved portion $abcd$. Let $R=bo=ao$ = radius of curvature of the portion $abcd$; d =distance between outer and inner surfaces.

To determine the value of R , we have geometrically:

$$ab:cd::R:d; \text{ whence we obtain}$$

$$R = \frac{ab \times d}{cd}$$

Under the supposition (sufficiently near the truth for the illustration) that the curves ab and cd do not change their lengths, we find that d and R are mutually dependent—one increasing with the other; or in other words, in such a section as fig. 2, as the tube assumes a more circular form, the radius increases or the tube bends outwards. If the form of tube be as shown in fig. 3 and fig. 4, with the cross-section



flattened in the opposite manner from fig. 2, the tendency of the pressure is to decrease the value of d and thus decrease

the value of R , or in other words, pressure will cause the tube to curl inwards.

If there be any who should doubt the facts and explanations which I have given, they could easily determine the action of pressure upon a bent closed tube with the cross sections represented in fig. 5.



Fig. 5.

Experimental tubes for illustration can readily be made of paper glued over wooden formers having the sections as above. By this means each can readily convince himself that it is not excess of pressure due to a greater surface of the one side over the other, but due simply to the tendency of the tube to change its oblong cross section into a circular one by an increase of pressure.

I do not know of the form of section shown in figs. 3 and 4 having ever been used or mentioned, excepting by myself, and it was then prepared to prove the truth of the explanation now offered by me. Its action being the reverse of that produced by the common form was a sufficiently practical proof that the usual method of explanation, "greater outward pressure due to difference of curves," was not correct.

The preceding explanation may be represented graphically as follows: Let $abcd$, fig. 6, represent the section of the tube before admission of the pressure; thus, under the same sup-

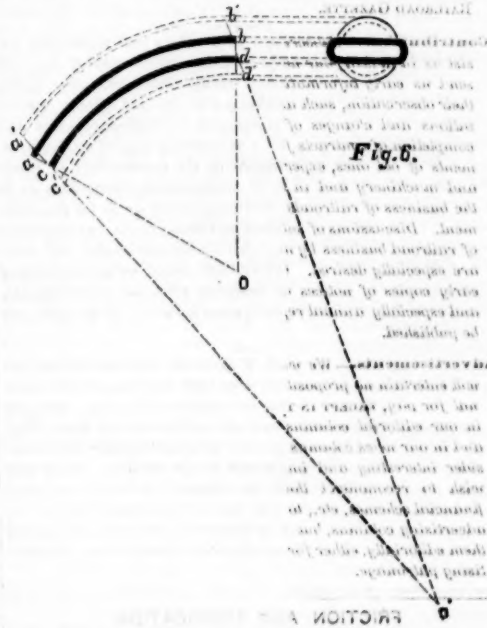


Fig. 6.

position that the tube does not change its length, we shall have after an increase of pressure ab occupying the position ab' , and cd the position cd' . By producing the radial lines of the new positions we shall find that ac' and bd' meet at O' , whereas the original center of curvature was at O . A similar illustration will apply to the tube of form shown in fig. 3, only in this case the pressure will reduce the radial distance.

THEODORE COOPER.

PERSONAL.

—Mr. Jeremiah Van Rensselaer, who died in New Brunswick, N. J., July 8, at the age of 62 years, was one of the older generation of railroad men, and in his time had held many important positions. He was connected with the Camden and Amboy as an engineer nearly 40 years ago, and was afterwards engineer of the first line built in the State of Mississippi. He was at different times Superintendent of the Saratoga & Washington, the Morris & Essex and the West Jersey roads. President of the old Hudson & Berkshire Company, and Vice-President of the New Jersey Railroad Company. His last active employment was as President of the New Jersey Express Company, which position he resigned on account of failing health some three years ago.

—Mr. Edward Vernon, Vice-President of the Arkansas Central Railway Company, sailed for England on the 11th on business connected with his company.

—Mr. David Brown has resigned his position as General Ticket and Assistant General Freight Agent of the Paris & Decatur Railroad, in order to accept a position on an eastern road.

—The friends of Mr. T. J. Higgins, Superintendent of Telegraph of the Cleveland, Columbus, Cincinnati & Indianapolis Railway, July 9, presented him with a writing desk, book case and library chair.

—Capt. Henry W. Tyler, Chief Inspector of Railroads, British Board of Trade, having completed his inspection of the Erie Railway, sailed for England last week.

THE SCRAP HEAP.

The Grand Trunk Proposals for Locomotives.
The Buffalo Commercial says that the Brooks Locomotive Works, whose name was not included in the list of those who bid for the 50 locomotives for the Grand Trunk, did put in a bid for the whole number and at the rate of \$9,850 per engine, being the third from the lowest and next above the Manchester Works.

Railroad Manufactures.

The Cummings Car Works at West Bergen, N. J., are building a number of passenger cars for the Rensselaer & Saratoga Railroad.

The New Haven (Conn.) Car Company recently turned out some passenger coaches for the New Jersey Midland.

The Danforth Locomotive Works at Paterson, N. J., is still at work on a heavy order for the Baltimore & Ohio.



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Editorial Announcements.

Addresses:—Business letters should be addressed and drafts made payable to THE RAILROAD GAZETTE. Communications for the attention of the Editors should be addressed EDITOR RAILROAD GAZETTE.

Contributions:—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements:—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

FRICTION AND LUBRICATION.

So much has been said and thought recently about the subject of friction that we have thought that a summary of the existing knowledge might be of interest and perhaps profit to some of our readers. To those who have studied this subject it may be well to say that the following remarks contain nothing new, and therefore may be made a subject on which the art of skipping can safely be exercised.

Whenever one surface moves upon another, the rough and projecting points of the two surfaces (which always exist, even in the smoothest surfaces) oppose resistance to the motion, and this resistance is called friction. One of the earliest treatises on friction was published by Guillaume Amontons, a French philosopher, in the papers of the French Academy of Sciences, in 1699. M. Amontons stated that friction was proportional to the pressure and independent of the surface, amounting to one-third of the pressure. This rough estimate has been corrected by the careful experiments of Coulomb and Morin, the mean results and conclusions of which will be found in another part of this article. It may be well, in the first place, to give a few definitions bearing upon the subject.

The coefficient of friction is a quantity expressing the ratio of the friction to the pressure. For instance, if the resistance to moving one piece of metal on another is one-fifth of the weight of the moving body, the coefficient of friction in this case is one-fifth, or 0.2. Hence, knowing the coefficient of friction, in any given instance, and the weight of the body causing the resistance, the amount of friction is found by multiplying these two quantities together.

The work due to or lost on account of friction, in any given time, is found by multiplying the amount of friction of the moving body by the space passed through in the given time. It is customary to estimate the amount of friction in pounds, to make the given time one minute, and to measure the distance passed through in that time in feet. The result obtained will then express the number of foot-pounds of work performed per minute in overcoming friction, and this can readily be reduced to horsepower, or any other desired unit of work. It is important to maintain the distinction between the amount of friction and the work of friction.

The experiments of Coulomb and Morin have demonstrated the following facts in regard to friction:

That it is proportional to the pressure.
With some limitations that it is independent of the area of the surface pressed, and independent of the velocity of motion.

The limitations are, that the pressure should not be so great as to abrade or wear away the surface rapidly, in which case the friction does not follow the laws enunciated above; also that the velocity of motion shall not be so great as to expel the lubricant. It is found, for instance, in the case of the journals of car axles that they require to be enlarged as the speed increases, in order to prevent the expulsion of the lubricant. The actual bearing surface of a journal is usually considered to be the projected area of that journal, or the product of the length multiplied by the diameter. For instance, if a journal is 4 inches in diameter and 7 inches long, the bearing surface is 28 square inches.

The pressure per square inch on the bearing surface should not exceed the following limits:

Velocity of periphery of journal.	Limiting pressure per sq. in. of bearing surface.
1 foot per second.....	382 lbs.
2½ feet per second.....	224 "
5 feet per second.....	140 "

Of course there should in all cases be a liberal allowance on the side of safety. That is, the pressure per square inch on the journal should be less or its area greater than the above theory indicates to be necessary.

Some other points besides the amount of surface exposed to friction should be considered in proportioning a journal, but before discussing them it may be well to give further results of the experiments of Coulomb and Morin. It is well known that one of the most common expedients for reducing the friction between two rubbing surfaces is to interpose some lubricant, which seems to form a coating to the projecting points, making the whole surface more continuous, and thus lessening the resistance. At very low pressures and velocities the viscosity of the lubricant occasionally causes the resistance to be increased instead of lessened, but in general the effect of an unguent is to decrease the friction in quite a large ratio. Careful experiments have been made with regard to the friction between two surfaces, when they were perfectly dry and clean, and when different lubricants were used. In this manner it has been found that good oil, such as olive oil, is one of the best lubricants; that lard is better than tallow, and that the use of water, instead of lessening the friction, generally increases it. Experiments upon the manner of applying the lubricant show that there is a great advantage in a continual application so as to keep a film constantly interposed between the rubbing surfaces, over the case in which the surfaces are merely kept slightly greasy. Below are given mean values for the coefficient of friction, in cases arising from the sliding of one plane surface upon another, the surfaces being supposed to be true, and, in common language, smooth.

Nature of the sliding surface.	Smooth surfaces with- out lubrication.	WELL LUBRICATED WITH					
		Water	Soap	Olive oil	Tallow	Lard	Lard & plum- bago
Wood on wood.....	0.38		0.144		0.071	0.066	
Wood on metal.....	0.41		0.20	0.064	0.079	0.076	
Metal on metal.....	0.18	0.311	0.197	0.071	0.092	0.075	0.070

These values, it must be remembered, are means of a variety of experiments. A valuable summary of the results of Morin's experiments on friction will be found in Trautwine's "Engineer's Pocket-Book." In the case of journals, the coefficient of friction is generally much less than for plane surfaces. Mean values of this coefficient, both for wood and metals, vary from 0.15, when the journal is only slightly unctuous, to 0.05, when there is a continual supply of the lubricant. In regard to journal friction, the amount is independent of the diameter of the journal, but the work required to overcome friction will of course be greater with a large than with a small journal, because the distance passed through by the periphery of the journal in a given time will be greater in the former case. If, then, the only requirement was to reduce the work of friction, it would be advisable to make the diameter of the journal as small as was consistent with strength. It is necessary, however, that the journal should have such proportions that the work of friction shall not cause it to be unduly heated, the effects of which are only too well known to railroad men. Some little space will be devoted to the discussing of this point.

Each foot-pound of work employed in overcoming friction, is converted into 1-772 of a unit of heat, or gives out heat sufficient to raise the temperature of 1-772 of a pound of water one degree on Fahrenheit's scale. On account of the difference between the specific heat of iron and water, it would raise the temperature of 0.01138 pounds of iron one degree. Assuming the data of the preceding example, it will be easy to determine how much each journal will

become heated in a given time, if none of the heat is carried off.

Pressure on each journal, in pounds.....	2,780
Multiply by coefficient of friction.....	0.05
Amount of friction on the journal, in pounds.....	139.5
Distance in feet passed through by periphery of journal per second.....	4.7
Multiply by.....	60
Distance in feet passed through by periphery of journal per minute.....	282
Multiply by amount of friction.....	139.5
Foot-pounds of work per minute required to overcome friction of journal.....	38,775
Multiply by.....	0.01138
Number of pounds of iron raised one degree in temperature, per minute, if none of the heat is dissipated.....	441.36

Now suppose that the journal alone receives all this heat, it will be interesting to calculate how much its temperature will be raised in a minute.

Area of journal, in square inches.....	9,621
Multiply by length of journal.....	5.4
Cubic inches of iron in journal.....	53,878
Multiply by weight of a cubic inch in pounds.....	0.2778
Weight of journal, in pounds.....	14,971
Divide pounds of iron raised one degree in temperature per minute by.....	14,971
Number of degrees Fahrenheit, that the temperature of the journal will be raised per minute, if none of the heat is carried off.....	29.5

It will be apparent from this illustration that if the heat caused by friction in a journal is not dissipated it will not be long before a temperature is reached that will burn the lubricant, after which the journal or its bearing will be quickly destroyed. In practice, it is found that this excessive heating never does occur with properly proportioned journals, if ordinary care is employed in lubrication. It is necessary, in other words, that the journal shall have sufficient surface to dissipate the heat caused by friction fast enough to prevent a great accumulation. The exact proportions necessary to secure this result can only be determined by experiment, but there are some general principles bearing upon the matter which it may be well to consider briefly.

Each square inch of the surface of the journal will dissipate by radiation a certain amount of heat in a given time, and whether or not the accumulation of heat can be prevented will depend upon the velocity of the journal, and the consequent rapidity of the conversion of the work of friction into heat. Hence, the number of square inches of surface required in the journal depends directly upon the velocity, and, other things being equal, a journal rotating twice as fast as another must have twice as much rubbing surface as the latter. Another thing must be observed, that it makes a great difference in what manner the rubbing surface is obtained. Suppose that two journals have the same length, and that the diameter of the first is twice that of the second. Then, for a given number of revolutions per minute, each square inch on the periphery of the first journal moves twice as far in a minute as each square inch on the periphery of the second journal, or has twice the velocity; hence, the first journal is just as likely to become unduly heated as the second, if each is subjected to the same pressure, and caused to revolve the same number of times per minute. It is easy to see that this is an illustration of the general principle that if their length is the same, the tendency of journals to heat is entirely independent of their diameters. Suppose, however, that two journals are compared, each having the same diameter, but the first being twice as long as the second. Then, for a given number of revolutions per minute, there will be twice as many square inches to dissipate the heat in the first journal as in the second, and the first journal will sustain double the pressure of the second without heating. It is evident, therefore, that in proportioning a journal so that it shall not heat, the diameter is a matter of indifference, it only being necessary to make it large enough for strength, in regard to the length of the journals, which latter is the most important consideration. The foregoing remarks will render it plain that the length of the journal must be increased with the increase of the pressure or number of revolutions, and may be decreased as the capacity of each square inch of the surface to dissipate heat is increased. In other words it may be said that the length of a journal, to prevent undue heating, varies directly as the pressure and number of revolutions in a given time, and inversely as a coefficient depending upon the capacity of the surface for dissipating heat. Expressed as a rule, it may be said that the proper length for a journal is equal to the pressure on the journal in pounds, multiplied by the number of revolutions per minute, and divided by a constant. This constant must be determined by experiment. To illustrate, suppose that on a certain railroad, the weight of a loaded car is 68,000 pounds; that it has 12 wheels, each 30 inches in diameter; that the greatest speed at which it moves is 50 miles an hour, and that observation has shown that journals 6 inches in length never heat with ordinary attention, while those whose length is 5½ inches give considerable trouble

* The reader who desires to see a fuller discussion of the principles just given will find them treated analytically in "Investigations of Formulas for the Strength of the Iron Parts of Steam Machinery," by J. D. Van Buren, Jr., C. E.

from this cause: what coefficient should be employed in proportioning the journals of car axles on this road?

Weight upon journals, in pounds.....	68,000
Divide by.....(24)	68,000
Weight upon each journal, in pounds.....	2,834
Multiply by number of revolutions per minute.....	560.6
Divide by length of journal.....(6)	1,588,457
Coefficient.....	231,469
Divide former product by length of second journal.....(5.5)	1,558,457
Coefficient.....	288,810

This shows that a coefficient between 231,469 and 288,810 should be used in determining the length of the journal in this particular instance. Those who are interested in the construction of rolling stock will have ample opportunity to make comparisons for obtaining coefficients which represent good practice. The proportions of the journal for the standard car axle have been fixed by the master car-builders, with an ample margin on the side of safety. There is still, however, considerable diversity of opinion in regard to the best size for the journals of locomotive axles and the crank-pins of locomotives, and it would be advisable to institute comparisons and observations by which standard data could be obtained. We shall be glad if our remarks have any tendency to arouse interest in this important matter.

There are many other points connected with the question of friction that need to be investigated, such as the value of the many patent compounds in the market as lubricants, and the qualities of the different compositions used for bearings. On page 195 of the last volume of the RAILROAD GAZETTE there is a description of a machine that seems well adapted for making such experiments. Tests of this nature, if they have been made at all, have rarely been placed on record, and the present article contains a tolerably complete summary of what may be said to be generally known of the nature of friction and the means of modifying it. It is to be hoped that, ere long, more complete data may be furnished to the engineering community, by some decided action on the part of the influential bodies of mechanics who are especially interested in such details.

Ticket Commissions.

The effort of the Railway Association of America last fall and winter to secure the abandonment of the practice of paying commissions on tickets seems to have ended in failure. After having united the Western railroads in favor of the movement and obtained the approval with the signature of the executive of two of the four chief lines to the East, with something like a promise of similar action from the others, nothing more was heard of it, and soon those who had been active in favor of the movement were troubling themselves to regain the good graces of the "scalpers," as they are called, who naturally felt stronger than ever after the failure of so vigorous an assault on their calling.

But now, with no noise of debates or publication of articles of agreement, we find that the four trunk lines whose co-operation alone was said to be needed last winter in order to secure success, have suddenly withdrawn all the tickets held for sale on commission in New York, just where it was thought most difficult to break up the practice.

In truth there has never been any considerable obstacle to making this reform except that of uniting the railroad companies in support of it, and especially the trunk lines. So long as there was a possibility that an attempt to change the practice would make enemies of an army of active agents who could control a large patronage, it was dangerous for one company even to advocate it without assurance that the others would join in the movement and make it a success. And whether this movement shall be successful depends more on the harmony of the companies than any other one thing, which, we fear, is not saying much for it, for continued harmony between the four companies concerned in this New York agreement we have not yet seen. As to the advantage of the change to the companies, there seems no reason to doubt it, though it is not impossible that some have depended so much upon commission sales that they will at first find themselves unprepared to maintain their business fully by their own efforts. It has been asserted that the traveling public will suffer greatly by it, but with six or eight ticket offices for each line in the city of New York, it will not be very difficult to buy a ticket, and if people cannot leave their hotels to get them, the landlords can as easily send a servant for them as for anything else and charge for the service if they please. The railroad companies are properly unwilling to pay, and that at a high price, for this convenience to travelers, if convenience it be. Whatever they can afford to deduct from their net receipts from tickets should be taken from their price and not given to unnecessary agents. If the companies can come to an agreement as to the manner of conducting the soliciting of business, probably their regular staffs will be sufficient—perhaps more than sufficient—to do all the work, releasing thus the army of agents and

runners who do not add one passenger to the whole number travelling, but simply neutralize each other's efforts in soliciting and do the work in other places than those where it should be done.

There would seem to be no reason in the nature of things why a railroad company should not pay a commission commensurate to the cost of doing the work for selling its tickets; and if railroad tickets were like articles of food, drink and dress, whose consumption could be largely increased by energetic efforts to sell them, it might be best to sell them altogether in that way. But when once it is made reasonably easy to get tickets, no amount of effort will increase the demand for them, except by taking from one line to give to another. Railroad companies generally will not hesitate to get business from each other any more than merchants or manufacturers. But as the result of the efforts usually is the expenditure of large sums of money with the sole final result of compelling your rivals to spend an equal amount, it cannot be called profitable. The agents of the A line have taken \$100,000 worth of business away from the B line at an expense of \$40,000, and the agencies of the B line have taken \$100,000 worth of business from the A line at an expense also of \$40,000. The true result is a net gain in traffic of nothing, and an expenditure of \$40,000 apiece.

It is true that a great many commission ticket agencies do not solicit business for one line as against another, but chiefly for their office as against all others, whether company or scalper. The money paid to these does not come under the head of expenditures paid to divert business, but rather of outlays for the support of men who might do you harm if you did not pay them—not altogether an unprecedented use of money, by the way, as the world wags now.

The Great Western Investigation.

The Investigating Committee appointed last fall at a half-yearly meeting of the Great Western Railway Company of Canada has made a long and quite minute report, in which it finds a great deal of fault with the management for sins of omission and commission. The financial condition of the company was and is such as to make shareholders anxious about their property, and perhaps incline them to believe in charges of mismanagement. For a series of years the profits grew rapidly, while last year they fell off very largely, and now, with a large addition of expenses to pay for the interest on the cost of the new Loop Line, and a largely increased mileage, the net earnings are much less than for many years, and there seems to be little immediate hope of a dividend. With the capacity of its old road increased and a large amount of new line, it has less traffic than before, while the proportion of expenses is larger. This experience of a decrease in traffic and earnings is too common this year to be wondered at in the case of the Great Western; but it is unusually unfortunate in the case of that road, because, unlike most other lines similarly situated, it has a largely increased interest account to meet, and, instead of a decrease in the percentage of expenses to earnings, as is common on most roads this year, it has actually an increase, not owing necessarily to any lack of ability in the management, but to the fact that the earnings are made on a much larger mileage, and there is a much larger property to maintain than that which last year produced larger earnings. The Great Western is like a landlord who last year had a hundred boarders in his house; but this year, having enlarged his hotel sufficiently to accommodate 150, has only 75 guests. Meanwhile, to keep up and pay rent on the premises costs much more than it did a year ago, and he not only has fewer patrons, but his profit on each one is much less—perhaps nothing.

With the construction of the Glencoe Loop Line and the negotiations connected with it the Investigating Committee finds a great deal of fault, charging the managers with misrepresentations and blundering. Doubtless the cost of this line has done more than anything else to bring the company into its difficulties, and it is proper that the circumstances attending its construction be examined critically.

At the time that this work was resolved upon, the only railroad between the Great Western and Lake Erie was the eastern end of the Buffalo & Lake Huron (worked by the Grand Trunk), though, indeed, the country offered little local traffic to attract a new road. The Great Western had a traffic which began to be unmanageable on a single-track road, and it was absolutely necessary that it be able to take all the traffic brought to it by its western connections, or the latter would be sure to enter into relations with some competing line, and that would have nearly or quite ruined the Great Western. The question then appeared to the managers somewhat as follows: We must very soon prepare to enlarge the capacity of our road by a large investment of capital. This enlargement may be either by doubling the track of the main line, or by constructing for the whole or a part of the distance a new line at a little distance from the old one. In favor of doubling the track was its greater cheapness and the advantage of an entire separation of the traffic in different directions, the avoidance of additional station expenses and expenses for maintenance; in favor of a distinct new line were the local traffic the road might draw from rivals further south, the easier grades, and especially the advantage of a Buffalo terminus by a shorter route than any then existing. Buffalo, it had been found, attracted the live stock traffic, a most important branch of the Great Western's business. It was a great city affording a considerable traffic of itself; and it offered a direct connection with the Erie Railway, and would render the Great Western less dependent upon the New York Central. Perhaps of more influence than any of these reasons was the fact that the Canada Southern Com-

pany at that time was making its first serious attempts to carry through its line, which for 140 miles would be but a very few miles distant from the Great Western's Loop Line. Doubtless it was supposed, and it was not altogether unreasonable to suppose, that if the Great Western should build its line, the Canada Southern could not get the money to build it, and thus the former would prevent the establishment of a formidable rival. It might well say to investors: There certainly is not traffic for two new railroads south of our line; and we shall certainly build one. Unfortunately an opportunity was given to prove the truth of this warning; for the investors did not heed it, the Canada Southern was built as well as the Glencoe Loop Line, and neither has a profitable business. But the Investigating Committee, besides objecting to the existence of the Loop Line, has fault to find with the facts attending its construction. One of these is the cost, which exceeded the estimates by one-third; but, besides the fact that this is so common an experience that skilled investors usually expect it, there were special reasons in the great rise in the prices of materials why the road should cost more than the estimates. Other changes seem to indicate some sad blundering.

The Glencoe Loop Line for 45 miles west of Buffalo would naturally be placed by the side of the Grand Trunk's Line. It was proposed to buy a half interest in this part of the road, and negotiations were begun and at one time apparently nearly concluded by which the Great Western would have avoided the cost of constructing 45 miles of new railroad. But the agreement finally was not made, and the Great Western built the new road. Again, the value of a Buffalo terminus would be almost nothing unless the trains could run into the city. The Grand Trunk had begun the construction of a bridge over the Niagara at this point which would make the city accessible. The Great Western was offered a half interest in this bridge, but after apparently accepting the terms offered, it failed to conclude the contract, and it now can cross the bridge only for tolls which it is unwilling to pay, and it has virtually abandoned its Buffalo terminus, and, having brought the traffic near the city, has leased one railroad and built another six miles long in order to join the Loop Line to the old eastern terminus and bring its traffic over Suspension Bridge. The shareholders certainly have an appearance of justification when they say: We built the Loop Line to get (1) a Buffalo terminus, (2) a shorter outlet, (3) easier grades, (4) to keep the Canada Southern out of the field. It is a dead failure, for the Canada Southern is in the field, right by our side; we have harder grades than ever, going from the Loop to the Main Line; the line is longer and not shorter, and we have substantially no Buffalo terminus.

Still, the company would probably not have disappointed its stockholders if business had continued to increase at the same rate as when the Loop Line was resolved upon. But for the decline in business that line, or something equivalent, would have been indispensably necessary for the accommodation of the Great Western traffic. And, of course, the growth of traffic is only arrested, not by any means ended, and the Great Western will yet, perhaps before the end of the year, find full employment for all its rolling stock, and for both Main and Loop Line. It may be, too, that when the traffic comes that will make the need of the Loop Line felt, arrangements will be completed for the use of the International Bridge and a Buffalo terminus.

The inference which the Committee appear to wish to have the shareholders draw is that the present management have encouraged the largest possible expenditures of new capital for the purpose of adding to the profits of those interested in contracts, etc., and that they have also taken advantage of their position and information for speculation in the company's shares. They do not expressly state the former, nor does the report give any testimony on the subject. Many of the things complained of seem mistakes rather than faults, and sometimes, in the light of the circumstances existing at the time the policies were determined upon, they were not then mistakes. The altered circumstances now show scores of railroad companies that, after having for years been crowded by their traffic, they have provided appliances too great for the traffic which now exists. This, however, is inevitable so long as traffic and prosperity are fluctuating.

There will be a meeting of the shareholders in London soon to consider the report made by this Committee, at which, doubtless, the management will present its defence.

The Erie Election.

The new Erie Directory is filled with some of the most eminent business men of the country, nearly all of whom have had great experience and success in railroad management and are now large railroad proprietors—in which, by the way, it resembles closely the directory which it succeeds, which was full of choice names, men eminent for character, ability and wealth. It is very nearly the same as has been heretofore announced, and is significant of a railroad millennium, the lion lying down with the lamb in the persons of the President of the Pennsylvania and the Vice-President of the Baltimore & Ohio; as to the little child who leads them we cannot say—perhaps it is Mr. S. L. M. Barlow, who voted on 550,000 of the 578,000 shares represented at the election and seems to hold the fortunes of Erie in the hollow of his hand.

As to the appearance of Baltimore & Ohio and Pennsylvania managers in the same directory, and that of a competing line, the fact will be interpreted, doubtless, to mean that these two companies will forego their long and bitter quarrels, which to an outside observer seem to have partaken of the malignity and unreason of a feud, and work in harmony with each other and with the Erie; and perhaps this interpretation is correct, though we would not like to vouch for it. If there is anything like an understanding between the two companies, perhaps Mr. Hugh J. Jewett, the new Erie President, is the best man

to preserve it; for he has long had close relations with both companies in connection with his Ohio roads.

Only one man of the new director, Mr. Homer Ramadell, of Newburg, was connected with the company during the reign of Gould and Fisk. Eight of the seventeen are new members—Hugh J. Jewett, of Columbus, O.; Thomas A. Scott, of Philadelphia; John King, Jr., of Baltimore; Marshall O. Roberts, L. H. Meyer, Henry O. Stebbins, R. Suydam Grant and John A. C. Gray of New York. The three first of these are known well as railroad men. Mr. Roberts, who has been one of the best known of New York business men and capitalists, was the first President of the Texas & Pacific; Mr. Stebbins was until lately Vice-President of that company, and is one of the most respected of New York capitalists; Mr. Meyer is a foreign banker, very widely known and trusted, especially by Amsterdam and Bankfort investors; Mr. Grant is a prominent banker, and Mr. Gray has been a director of the Buffalo, New York & Erie, lately purchased by the Erie.

Only two of the seventeen were in the board which immediately succeeded the Gould board; but five—Messrs. Schuchardt, Duncan, Morgan, Barstow and Ramadell, were chosen at the first regular election succeeding the *coup d'état*, that is, two years ago, when Mr. Watson was made President. The directors, therefore, has been a very changeable one, but probably it cannot be said that there has been any real change of control since Gould was ousted, for Mr. Barlow has, we believe, held a majority of the proxies at every election.

It is of course gratifying that so important a property should be in the hands of so good a directory; but it must not be expected that these men will be able to release it from its difficulties by the force of their good names and talents alone. These with about twenty millions of dollars would perhaps do it. Their good names will help somewhat to get the money; but we believe that few of the directors have a large interest in the company's stock, and it is not to be expected that they will do much directly towards raising the needed capital. That, doubtless, must be raised abroad, where most of the shares are held, and where the people to be benefited by the new capital chiefly live. We regret to say that there are few indications that American holders of Erie stock will be likely to risk much in efforts to permanently improve the property. Indeed, we are not sure that there are any permanent holders of that stock; what is here seems to float from hand to hand, no one hoping to receive an income from it in the shape of a dividend, but only to keep it until by some accident or trick he can sell it for more than it cost him. Perhaps the stock abroad has something of the same experience; if so we shall probably have to chronicle the bankruptcy of the Erie Railway one of these days, and we shall do it with a great deal of pleasure, for then there will be a reasonable hope that the proprietors of the road will put it in condition to answer the requirements of its traffic and thus, in the only possible way, earn a good income on the capital invested in it, which it can easily be made to do; though would not be understood as assuming that the whole \$78,000,000 of common stock is capital invested in the road.

Record of New Railroad Construction.

This number of the RAILROAD GAZETTE has information of the laying of track on new railroads as follows:

Lewistown & Auburn.—Completed from Lewistown, Me., southwest 6 miles to the Grand Trunk Railway near Danville Junction. **Peachbottom.**—Track is laid on the western end from York southeast 7 miles to Dallastown, Pa. **Southern Pacific.**—Extended from Delano, Cal., southward 40 miles.

This is a total of 53 miles of new railroad, making 690 miles completed in the United States in 1874.

Erratum.

Last week in describing Plates 5, 6, 7 and 8, in regard to Plate 6, which was an engraving of an American locomotive by the Danforth Locomotive and Machine Company, we inserted a description of a similar locomotive by the Hinkley Locomotive Works. The mistake was in printing the engravings, a Danforth having been substituted for a Hinkley engine. The latter will be published hereafter.

POSTAL-CAR SERVICE seems to be still in an unsettled condition. The Philadelphia, Wilmington & Baltimore, which was to take off the postal cars on the first of July, has not done so, having received assurance, it is said, of an honest effort to settle the question equitably. Senator Mitchell, of Oregon, who is at the head of the sub-committee on this subject of the Senate Committee on Transportation made a report, it seems, on the last day of the session of Congress on the power of Congress in the matter, a summary of which has lately been published. He holds that Congress, under the delegation of power in the part of the Constitution which says that Congress shall have the power to establish post-offices and post-roads, may provide for the transportation of its mails over railroads owned by private corporations, without the consent of such corporations, or of the State in which such roads are located, by paying just compensation; that this may be done by an exercise on the part of Congress of the right of eminent domain. He holds generally that the power to take private property for the purpose of the transportation of the public mails, does not depend upon any express provisions of the Constitution, but that it is an inherent attribute of sovereignty existing in every independent State. This has been spoken of as being an extreme view of the authority of Congress; but if the summary is correct it seems to be nothing more than what has always been admitted by railroad companies and very distinctly affirmed by Mr. Theodore Cuyler, attorney of the Pennsylvania Railroad Company, in his argument before the Committee a year ago. Doubtless Congress has authority to exact any service from railroad companies for just compensation. The question is entirely concerning the compensation, and whether Congress shall be sole judge as to what just compen-

sation is. The summary of Mr. Mitchell's report says that: "While declaring the existence in the General Government of the power mentioned, Senator Mitchell does not recommend resort to its exercise at this time, and only in case of absolute necessity, if such should arise. He contemplates such changes in our postal laws as will enable the Department to make just compensation for the carriage of mails on railroads, and also tend to the extension of the mail service as the growth of the country may demand. The present law he regards as essentially defective, and he therefore proposes to devote a large part of his time, during the recess of Congress, toward perfecting a bill, the provisions of which he hopes will be acceptable to the railroad companies, and at the same time be just to the Government."

That will be a very good work to do. The present law reckons the service and the pay for it in a most unreasonable and unequal way, with very little reference to the expense incurred by the parties performing it, some of whom, doubtless, are overpaid, while others are shamefully underpaid.

NEW YORK GRAIN DELIVERIES are likely to be so managed hereafter as to do away with some of the greatest obstacles to transfers between cars and vessels and warehouse, which have heretofore limited the usefulness of the railroads as grain carriers, and made the conduct of the business so slow and expensive at New York that a considerable diversion to other places was threatened. For some months negotiations have been going on between a committee of the Produce Exchange and representatives of the New York Central, the Erie and the Pennsylvania railroads. These have finally agreed upon a body of rules which, if approved by the managers of the railroads and the Produce Exchange, as they are pretty sure to be, will introduce a system of inspection similar to that of the lake cities, by which grain received will be graded, weighed and delivered according to grade on negotiable certificates issued after inspection and weighing. Vessel cargoes shipped from the West on through bills of lading, however, by way of Erie or Buffalo, will be delivered as heretofore in boat loads without inspection, the difficulties in this case, owing to the large quantities received at once, not being formidable.

ASIATIC LOCOMOTIVES made their appearance, for the first time in the history of the world doubtless, last year, when the Bombay, Baroda & Central India Railway Company built three tank locomotives for freight service at its shops at Parcel.

Testing an Old Boiler—Additional Information.

[Since the publication of the letter with the above title in the RAILROAD GAZETTE of last week, we have received from the writer the following additional information concerning the test in question:]

LOUISVILLE, Ky., July 6, 1874.

With a pressure of 285 pounds the circumference of the cylinder boiler was increased nearly 3-16 of an inch, the longest horizontal seams in the cylinder boiler opened about the thickness of a line, but did not leak any. With this pressure a crack about 2½ inches long in one corner of the "throat" sheet at top and where it joins the cylinder boiler opened and let off the pressure; upon subsequent examination the crack proved to be an old one, and was the result of expansion and contraction, but could not be seen from the outside before opened by the pressure. When the pressure was removed the circumference of the boiler remained 1-16 of an inch larger than the original size, which is the amount of permanent stretch of the metal at that pressure. After putting a patch over the crack described, the pressure was raised to 290 pounds, when five out of eight ¾ inch bolts that connect the vertical braces from the steam-dome to the crown sheet broke off at nut under the crown sheet. With this pressure the circumference of the cylinder boiler was increased ¼ of an inch, and when the pressure was removed (by breaking off the bolts referred to), it remained nearly 3-32 of an inch larger than the original size, and this is the amount of permanent stretch. At this pressure the horizontal seams in cylinder boiler commenced leaking. The broken brace-bolts referred to being replaced with stronger ones, as soon as 290 pounds pressure was again indicated on the gauge all the horizontal seams in the cylinder part of boiler leaked a continual stream, the crown-sheet was forced downward one inch, and all the crown-bars were bent and broken in the middle. The crown-bars are 3½ by 1½ inches, made of two pieces on edge, welded together at the ends, and riveted between the crown-bolts. The ends of the bars rested on the edge of the side-sheets of the fire-box. The sheet forming the "wagon-top" of boiler burst open, commencing at the flange at the back of the steam-dome, and the opening extended backward 10 inches and upward on back of steam-dome, tearing it in two places, commencing at opening in the wagon-top; one sheet of the cylinder boiler was ruptured on the inside of lap of horizontal seam. This pressure of 290 pounds proved to be the ultimate that the boiler would stand, and seemed to affect it more or less all over, and clearly indicated the weak points in this particular boiler. The large patch of boiler-plate put on each side of the boiler, as above stated, remained perfectly tight with the last pressure, did not leak at bolts or joints, and showed no appearance of weakness. The sides of the boiler where the patches referred to were placed were forced outward 1-16 of an inch. None of the seams or stay-bolts in the furnace end of the boiler, or in fire-box, leaked any with the highest pressure that was on the boiler during the experiments.

OBSERVER.

Kansas Midland.

The stations on this new road with the distances from Topeka, Kan., are: Spencerville, 7.8 miles; Chandler's Mill, 10.5; Glendale, 13; Leecompton, 16.3; Lake View, 20.8; Lawrence, 26.6. The latest time table shows two daily trains each way, a passenger and a mixed train.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

—Mr. H. H. Roberts has been appointed General Freight Agent of the Western Division of the Chicago & Lake Huron Railroad, with office at Battle Creek, Mich. Mr. Roberts has been until recently connected with the Louisville, New Albany & Chicago Railroad.

—Mr. Lewis Carter, of Deep River, Conn., has been appointed Acting Superintendent of the Shore Line Division of the New York, New Haven & Hartford Railroad in place of Mr. W. M. Wilcox, who was recently killed. Mr. Carter came on the road eight years ago as brakeman, was then promoted to be baggage-master, and for about two years has been a conductor. He will, it is said, probably be appointed to the position permanently.

—The directors of the newly organized Burlington & Lamoille Railroad Company have elected D. C. Linsley, of Burlington, Vt., President, and C. W. Woodhouse, Clerk.

—At the annual meeting of the Lake Shore & Tuscarawas Valley Railroad Company in Cleveland, O., July 8, the following directors were chosen: Clement Russell, Massillon, O.; W. S. Streater, J. W. Tyler, R. L. Chamberlain, J. F. Card, R. B. Dennis, James Mason, H. M. Claflin, W. E. Clark, Darius Adams, O. Young, Cleveland, O. The board subsequently elected the following officers: President, W. S. Streater; Secretary, Wm. H. Grout; Treasurer, R. L. Chamberlain; Chief Engineer and General Superintendent, W. W. Card; Executive Committee, J. W. Tyler, R. L. Chamberlain and J. F. Card. Mr. Chamberlain takes the place of A. S. Gornum as Treasurer, the other officers being re-elected.

—Mr. O. A. Haynes is Master Mechanic and Mr. Doolittle Master Car Builder of the Missouri Division of the consolidated St. Louis, Iron Mountain & Southern Railroad. Their offices are at Carondelet, Mo. Mr. L. Finlay has charge, as Master Mechanic and Master Car Builder, of the Arkansas Division, with headquarters at Little Rock, Ark.

—Mr. John McLeod, for some time past Chief Engineer of the Louisville, Paducah & Southwestern Railroad, has been appointed General Superintendent of the Louisville, Cincinnati & Lexington, in place of George Skinner, who has resigned.

—Hon. A. W. Markley has been appointed Receiver of the Bridgeton & Port Norris Railroad in a foreclosure suit, by the Chancellor of New Jersey.

—Col. Henry Bowman has been appointed Purchasing Agent of the Erie Railway, in place of G. W. N. Curtis, who has resigned.

—The officers of the Hanover Junction & Susquehanna Railroad Company are: President, Robert T. Ryon; Secretary and Treasurer, John S. Given; directors, Samuel Musselman, J. Z. Lindemuth, J. G. Hess, James Ryon, Samuel E. Hiestand, Dr. F. Hinkle.

—The first board of directors of the Longmont, Fort Collins & Northwestern Railroad Company is as follows: A. K. Yount, A. H. Patterson, Joseph Mason, F. W. Sherwood, James Sullivan, W. A. Buckingham and Thos. Cross. The company's offices are at Fort Collins, Larimer County, Colorado.

—At the first meeting of the directors of the New Orleans, St. Louis & Chicago Railroad Company in New Orleans, the following officers were elected: H. S. McComb, President; S. H. Edgar, Vice-President; A. M. West, Second Vice-President; R. S. Charles, Treasurer; Wm. Calhoun, Secretary; R. P. Neely, Assistant Secretary; Executive Committee, H. S. McComb, Thos. A. Scott, H. J. Jewett, J. B. Alexander, J. S. Rogers. The following officers were appointed by the President, under authority of the board: E. D. Frost, General Manager; A. J. McConico, Auditor; S. E. Carey, General Passenger and Ticket Agent; D. B. Morey, General Freight Agent.

—Mr. Robert Meek, Superintendent of the Clarksville Division of the Louisville & Nashville, has been appointed superintendent of the South and North Alabama road, in place of M. Stanton, who has resigned.

—At the annual meeting of the Rochester & State Line Railroad Company in Rochester, N. Y., recently, the following directors were elected: George J. Whitney, Charles F. Smith, G. H. Perkins, Edward Harris, George E. Mumford, George Darling, M. F. Reynolds, Thomas Leighton, Rochester, N. Y.; D. D. S. Brown, Scottsville, N. Y.; Oliver Allen, Mumford, N. Y.; William Bristol, Warsaw, N. Y.; A. D. Scott, Ellicottville, N. Y.; James Tillinghast, Buffalo, N. Y.

—At the annual meeting of the Erie Railway Company in New York, July 14, the following directors were elected: John Taylor Johnston, Frederick Schuchardt, Wm. Butler Duncan, Edwin D. Morgan, H. R. Baltzer, S. L. M. Barlow, Lucius Robinson, Cortlandt Parker, Homer Ramsdell, Hugh J. Jewett, Thomas A. Scott, John King, Jr., Marshall O. Roberts, L. H. Meyer, Henry O. Stebbins, R. Suydam Grant, John A. C. Gray. The board met subsequently and elected Hugh J. Jewett, President; Wm. P. Shearman, Treasurer; A. R. McDonough, Secretary. At the meeting \$57,800,000 of stock was voted on, of which Mr. Barlow held proxies for \$55,000,000.

The new directors are Messrs. Jewett, Scott, King, Roberts, Meyer, Stebbins, Grant and Gray, who replaces S. D. Babcock, George H. Brown, W. W. Shippin, Giles Hotchkiss, H. L. Lansing, Wm. T. Hart, A. Iselin and P. H. Watson. Of the new directors Mr. Scott is too well known to require any description; Mr. Jewett has been Vice-President and General Manager of the Pittsburgh, Cincinnati & St. Louis; Mr. King is Vice-President of the Baltimore & Ohio; Mr. Stebbins was latterly Vice-President of the Texas & Pacific, and Mr. Roberts was the first President of that company, and both of them are New York business men, as is Mr. Meyer; Mr. Grant is a banker and one of the owners of the Grant Locomotive Works at Paterson. The Treasurer and Secretary are re-elected.

TRAFFIC AND EARNINGS.

—The grain receipts at Chicago, Milwaukee, Duluth, Detroit, Toledo, Cleveland, St. Louis and Peoria for the week ending July 4 were 85,498 barrels of flour, 1,621,120 bushels of wheat, 2,452,124 of corn, 354,141 of oats. For the time from January 1 to July 3 the receipts at these places, Peoria excepted, were:

	1874.	1873.	1872.	1871.
Flour, bbls.....	3,199,432	2,980,350	2,227,639	2,387,470
Wheat, bush.....	38,054,518	20,257,444	9,005,519	17,043,660
Corn, bush.....	31,309,456	28,030,202	38,566,309	28,666,260
Oats, bush.....	13,081,903	15,34,220	12,958,034	7,665,968
Barley, bush.....	2,150,251	2,390,369	1,573,695	828,154
Rye, bush.....	691,759	632,325	774,691	677,406
Total, bush.....	85,287,787	66,384,530	62,878,438	54,781,460

—The shipments of grain from Buffalo and Oswego for the week ending July 4 amounted in the aggregate to 733,478 bushels by rail and 921,246 by canal from Buffalo, and 338,163 bushels by canal from Oswego.

—At Chicago during the month of June there were 1,734 arrivals of vessels with an aggregate tonnage of 500,913, while 1,677 vessels cleared with an aggregate tonnage of 479,816.

—The Detroit Tribune gives the following statement of the amount of shipping now afloat on the Great Lakes, including Canadian: Of sail vessels there are 1,703; steamers of all kinds,

945; barges or vessels without fit-out, 2,700, making a total of 5,367, and burden, 822,235.06 tons.

The Great Western Railway of Canada reports its earnings and working expenses for the month of May as follows:

	Earnings.	Expenses.	Net Earnings.
1874.....	\$448,000	\$343,000	\$105,000
1873.....	512,498	349,656	192,842
Decrease....	\$94,498	\$6,656	\$87,842

The decrease is about 17½ per cent. in gross earnings, nearly 2 per cent. in working expenses, and 45 per cent. in net earnings.

The earnings and expenses of the Union Pacific Railroad for May were:

	1874.	1873.	Decrease.	%
Earnings.....	\$910,005.13	\$1,007,831.27	\$97,826.14	9%
Expenses.....	458,322.02	490,322.23	31,999.61	6%
Net earnings.....	\$451,742.51	\$517,509.04	\$65,766.53	12%

The earnings and expenses for the five months ending May 31 were:

	1874.	1873.	Decrease.	%
Earnings.....	\$3,660,751.29	\$3,613,112.59	\$47,638.70	1%
Expenses.....	2,018,684.20	1,935,796.79	77,887.41	4%
Net earnings.....	\$1,642,067.09	\$1,677,315.80	\$35,248.71	2%

The expenses were 55.01 per cent. of the earnings in 1874, and 53.58 per cent. in 1873. The earnings were \$3,547 per mile in 1874, and \$3,501 in 1873.

The earnings of the Indianapolis, Cincinnati & Lafayette Railroad for May were:

	1874.	1873.	Decrease.	P. c.
Earnings.....	\$144,871	\$167,293	\$22,422	13%
Expenses.....	99,064	119,847	20,783	17%
Net earnings.....	\$45,807	\$47,446	\$1,639	3%

For the five months ending May 31, the earnings were:

	1874.	1873.	Decrease.	P. c.
Earnings.....	\$718,750	\$743,038	\$24,288	3%
Expenses.....	482,762	611,043	128,281	21%
Net earnings.....	\$235,988	\$131,995	\$103,993	86%

The expenses were 66.25 per cent. of earnings in 1874 and 82.24 per cent. in 1873. The earnings were \$4,094 per mile in 1874, and \$4,174 in 1873.

The coal traffic of the Pennsylvania Railroad Company's New Jersey lines for the six months ending June 27 was 612,981 tons, of which 340,793 tons went to South Amboy and 129,967 to Coal Port for shipment, and 142,221 tons to way points.

The Denver & Rio Grande Railway reports earnings for June as follows:

	1874.	1873.	Decrease.	P. c.
Earnings.....	\$38,083.17	\$38,394.78	\$311.61	0%
Expenses.....	17,024.89	16,339.72	685.17	4%
Net earnings.....	\$21,058.28	\$22,055.06	\$996.78	5%

The expenses were 44.71 per cent. of earnings in 1874 and 47.78 per cent. in 1873. The earnings were \$323 per mile in 1874 and \$325 in 1873. The report is from the main line (118 miles) only.

The following companies have thus far reported earnings for June:

	1874.	1873.	Decrease.	P. c.
Atlantic & Great Western.....	\$413,302	\$423,514	\$10,212	2%
Bur. Ced. Rap. & Minn.....	91,305	96,696	5,391	5%
Central Pacific.....	1,380,000	1,301,203	\$78,797	6%
Chil. Mtl. & St. Paul.....	886,000	929,221	43,221	4%
Clev. Col. & Ind.....	330,754	405,721	72,967	17%
Denver & Rio Grande.....	38,083	38,395	312	0%
Illinois Central.....	678,728	742,600	63,872	8%
Missouri, Kan. & Texas.....	287,420	249,343	11,923	4%
Mobile & Ohio.....	120,407	148,691	28,284	19%
Ohio & Mississippi.....	294,838	290,477	\$4,361	1%
St. Louis, Alton & T. H.....	98,363	116,365	18,002	15%
Main line.....	43,226	49,956	16,730	11%
St. Louis, Iron Mt. & S.....	238,610	216,223	22,387	10%
Toledo, Peoria & Warsaw.....	84,356	111,683	27,325	24%
Toledo, Wabash & West.....	388,535	541,192	152,657	28%
West Wisconsin.....	74,937	71,135	3,802	5%

The earnings of the Atlantic & Pacific Railroad and leased lines for the six months ending June 30 were: 1874, \$2,287,890; 1873, \$2,372,959; decrease, \$85,069, or 3½ per cent.

The earnings of the Rockford, Rock Island & St. Louis Railroad for April were:

	1874.	1873.	Decrease.	%
Earnings.....	\$63,934.07	\$63,934.07	0	0%
Expenses (72.24 per cent.).....	46,185.48	46,185.48	0	0%
Net earnings.....	\$17,748.59	\$17,748.59	0	0%

The earnings of the Lake Shore & Tuscarawas Valley Railroad Company for the year ending May 31 were:

	1874.	1873.	Decrease.	%
Earnings.....	\$329,547.36	\$329,547.36	0	0%
Expenses (67.29 per cent.).....	198,816.46	198,816.46	0	0%
Net earnings.....	\$130,730.90	\$130,730.90	0	0%

OLD AND NEW ROADS.

Hannibal & St. Joseph.

The managers of this company say that there is a reduction of \$25,000 per month on the pay rolls of the road, as compared with last year, and a reduction in the same proportion in all other expenses; also that, in spite of the general dullness of business, the road is earning more money net now than at any time for three years before, and enough to leave a considerable surplus after paying all working expenses and interest charges.

Government Transportation on Land Grant Railroads.

The War Department has issued a circular giving the opinion of the Solicitor-General with regard to the meaning of the recent act of Congress concerning transportation on land grant railroads. He says that reference to the legislation under which, especially within the last ten years, land grants have been made to railroad companies, shows, in connection with the above question, that such grants may be divided into three classes:

1. Cases in which, in one form of expression or another, free transportation is expressly stipulated.
2. Cases in which conditions of preference in transportation, or of ordinary rates of transportation, or of average rates, etc., are all that have been expressly imposed.
3. Cases where no conditions for the use of said road by the Government have been imposed.

"In my opinion," the Solicitor-General says, "there can be no question that the first are included within, and the third excluded from the operation of the act of June 16, 1874, quoted above. The third class is a very small one, and probably exists by inadvertence of the Legislature; but as Congress has limited its above prohibition to cases of grants 'upon any [other] conditions for the use of such road,' these, having no such condition attached, are not included. I am of opinion that cases under the second class are included within the prohibition. Indeed, this is the only class upon which the act has any effective operation; for the first class is already excluded from payment by the very acts which grant the land, and has been recognized heretofore by the Department of War. A consideration of the passage just quoted brings me to the

conclusion that it was the intention of Congress to use no appropriation at present for any case where the original grant may have given to them control of the question; and further, by a comprehensive expression, to remit all questions as to the extent of that control to the Court of Claims."

Maine Central.

This company operates the following lines:

	Miles.
Portland to Bangor.....	135½
Cumberland Junction to Augusta and Skowhegan and Bath Branch.....	101½
Brunswick to Leeds Junction and Lewiston.....	33
Leeds Junction to Farmington.....	37½
Belfast to Burnham.....	33½
Newport to Dexter.....	14
Total.....	355½

The Newport & Dexter and Belfast & Moosehead Lake roads are leased at a fixed annual rent; the other lines, owned by the Portland & Kennebec, Somerset & Kennebec, Androscoggin and Leeds & Farmington companies, are practically consolidated with the Maine Central, and will be formally consolidated when the necessary legal authority can be had.

The operations for the year 1873 were as follows:

	1873.	1872.
Passengers.....	\$916,405.22	\$877,498.72
Freight.....	1,010,615.11	947,805.19
Car use.....	65,303.65	34,776.43
Mail.....	33,911.58	33,911.94
Express.....	37,283.00	33,153.71
Extra baggage.....	1,836.45	1,746.53

Total earnings.....	\$2,065,360.11	\$1,928,807.52
Fuel and repairs of tools.....	178,674.23	230,132.82
Maintenance of way.....	467,296.37	465,449.16
Train expenses.....	4,361.16	38,001.61
Station expenses.....	191,002.62	176,739.19
Office establishment.....	35,396.51	43,861.41
General expenses and taxes.....	36,405.27	26,796.29
Discrepancy of accounts in Mechanical Department, 1871-'73.....	12,465.28	
Total expenses.....	\$1,350,501.44	\$1,328,989.48

Net earnings.....\$734,858.57 \$599,825.04

Gross earnings per mile.....\$5,818 \$5,433

Net earnings per mile.....2,070 1,690

Percentage of expenses.....64.42 68.90

The increase in gross earnings is \$136,552.49, or 7.08 per cent. in expenses, \$1,518.96, or 0.11 per cent.; in net earnings, \$135,033.53, or 22.51 per cent.

The work of the year was as follows:

Passengers carried.....	719,700
Average mileage of passengers.....	38.33
Receipts per passenger per mile, cents.....	3½
Tons of freight carried.....	401,904
Average miles per ton.....	87.6
Receipts per ton per mile, cents.....	4.37
Passenger train mileage.....	580,593
Freight train mileage.....	428,115
Other train mileage.....	270,508
Total train mileage.....	1,279,216

There was an increase of 6.61 per cent. in the number of passengers and 11.86 per cent. in tons of freight carried.

The equipment has been increased by 6 locomotives, 6 passenger, 5 baggage and 1 postal car; 200 box, 115 platform, 4 caboose cars and 6 snow-plows.

The Chief Engineer reports that during the year 11 new bridges have been built and 58 bridges and culverts repaired; five new water stations, three new turn-tables and a new freight house at Pittsfield have been put up. In repairs of track there have been used 31.06 miles new rails, 20.4 miles repaired rails and 69,865 new ties; three miles of new side track has been laid, 67.3 miles of track ballasted and 36.6 miles of new fence built. There has been expended on permanent improvements \$134,335.54, these including the new Benton line, the new Waterville bridge and wharves at Portland and Belfast. After the burning of the Waterville bridge it was decided not to rebuild it, but to locate a new iron bridge between Waterville and Kendall's Mills. The main line is now secure from interruption by the burning of any important bridge.

The income account is as follows:

Net earnings.....	\$734,858.57
Rents, wharfage and Dexter & Newport dividends.....	2,717.77
Dividends on Portland & Kennebec stock.....	124,800.00
Notes payable.....	60,824.84
Dividends and coupons not presented, etc.....	19,114.23
Balance from last year.....	669,819.21
Total.....	\$1,612,134.63

Interest on bonded debt.....\$395,739.62

"floating debt.....77,216.42

Dividends on Portland & Kennebec stock.....44,484.00

"certificates and interest scrip.....32,148.00

Rent, Dexter & Newport.....18,000.00

Belfast & Moosehead Lake.....36,000.00

Discount on bonds.....3,742.50

Improvement account.....130,151.66

Equipment account.....341,899.04

Paid on principal of bonded debt.....34,826.38

Balance to next year.....498,121.11

Total.....\$1,612,134.63

The capital account at the close of the year was as follows:

Maine Central stock.....	\$3,615,800.00
Portland & Kennebec stock.....	741,400.00
Maine Central bonds and coupons.....	18,720.00
Yarmouth stock.....	37,000.00
Bonded debt.....	6,394,182.51
Maine Central interest scrip.....	496,992.00
Notes payable.....	891,640.21
Overdue coupons, etc.....	19,114.23
Profit and loss.....	445,958.98
Total.....	\$12,650,704.93

The stock is \$14,327 and the bonded debt \$22,374 per mile.

The report criticises severely the strictures upon the company contained in the last report of the Boston & Maine.

Warwick.

This road, now under construction from a point on the New York, Providence & Boston road five miles south of Providence to Coweset Bay, will, it is expected, be finished in September. The road will have large summer pleasure travel, and a coal wharf is to be built at the bay terminus. It is expected to receive annually 150,000 tons of coal. George W. Beach & Co. are the contractors and Mr. Samuel N. Keith is Chief Engineer.

Rochester & State Line.

The road from Rochester to Le Roy is being ballasted and the grading in Le Roy Village completed. It is intended to have trains running on this section by August 1.

Baltimore & Drum Point.

The line from Annapolis to Baltimore is to be put under contract as soon as the company receives the \$200,000 which the people of Anne Arundel County, Md., voted to subscribe to the stock.

Glendale.

Operations on the new "Glendale Railroad," as it is called, in accordance with the terms of the charter passed by the

cent Legislature, have already been commenced. The survey is being prosecuted by Mr. Charles Bowler, under whose management the enterprise has been placed. The contemplated route is almost a straight line from the foot of North Thirteenth street, Williamsburg, L. I., to Glendale, the second station beyond Bushwick, on the South-side Railroad, and avoids the detour made by the latter road through the streets of the city to the foot of South Eighth street, thus saving nearly a mile in distance, besides securing a clear run by locomotive to the water's edge. It is proposed to run first-class ferry-boats to New York in connection with the road.

Sherbrooke, Eastern Townships & Kennebec.

Tracklaying has been begun on this road at Sherbrooke, Quebec, and an engine is on the line. The road from Sherbrooke to Weedon, 36 miles, is to be finished this year.

Montpelier & Rutland.

Books of subscription have been opened at Montpelier, Vt., Rutland and other towns on the line. Work is to be commenced as soon as \$400,000 is subscribed to the stock.

Leavenworth, Lawrence & Galveston.

The bondholders are asked to contribute some \$42,000 to redeem lands that have been sold for taxes, which the company is unable to pay. These lands form part of the security for the first mortgage bonds.

Rochester, Nunda & Pennsylvania.

It is stated that the Mayor of Rochester, N. Y., has vetoed the ordinance of the City Council appropriating \$50,000 of the aid voted to this road for its immediate use.

The Erie Meeting.

At the annual meeting of the company on the 14th inst. the stockholders adopted resolutions thanking the officers and directors "for their careful and patient labor for the past year and for the fidelity with which they have administered the affairs and business of the company;" approving and confirming the action of the directors in creating the second consolidated mortgage for \$40,000,000, and issuing part of it, and they also approved and confirmed the contract for the lease of the Atlantic & Great Western, the purchase of the Buffalo, New York & Erie, and the purchase of interests in coal companies and coal properties.

Before the stockholders meeting a final meeting of the old board was held at which the following resolutions were passed by a unanimous vote:

"Resolved, That this board regret exceedingly the necessity of parting with their valued and estimable associate, with whom their intercourse has always been so agreeable, and for whom they have learned to entertain the most sincere friendship and respect."

"Resolved, That few men could have been brought to the position Mr. Watson leaves so much integrity, resolution to combat wrong, to expose and guard against carelessness in duty, watchfulness against waste and extravagance, industry, energy and conscientiousness in administration, or capacity to wield the great powers of the presidency, as belong to and have been shown by him; and that our regret on parting with him is increased by the conviction that his impaired health is the unavoidable result of a faithfulness to the trust confided to him, which has led him to forget himself in his regard for the duty and the interests of others."

"Resolved, That in view of the attacks on the interests of the Erie Company and the integrity of its management, which malevolence, selfishness and ingratitude have lately made, we congratulate our President that investigation only brings out more clearly the correctness and fidelity of his management, and increases and extends a reputation as an honest man which belongs to his country, and of which she must ever be proud."

"Resolved, That a copy of these resolutions be attested and delivered to Mr. Watson."

The following is reported as the substance of a statement made to a reporter by the new President:

"He had accepted the presidency of the Erie Company with the determination, if possible, of placing the road on such a basis as would enable it to compete successfully with the other great trunk lines. He was fully aware of the great difficulties that he would have to contend with, but was resolved to do his best to overcome them. The report telegraphed to New York that his acceptance of the presidency of the company depended upon a favorable report being made by the English accountants, was without foundation. He entertained little doubt that the report in question would reveal many errors and abuses, but he (Mr. Jewett) had prepared himself for the worst, and clung to the hope that by energy and organization the fortunes of the road could be retrieved. What direction the changes and reforms he contemplated would take, he was not at that moment prepared to say. That a reform, and a very thorough one, was needed could not be denied. He had not taken charge of the road for the purpose of losing his reputation as a railroad man, and he hoped his administration of the affairs of Erie would be successful and satisfactory to the stockholders. The first thing he proposed to do was to examine for himself into the condition of the road, and upon the result of that examination would depend his future course and conduct. As to whether the attempt would be renewed to alter the gauge of the road, Mr. Jewett stated that he was not at present in a position to speak positively. Before any important movement of that kind was entered on he was determined to acquaint himself thoroughly with the condition of the road and the state of its finances."

Dividends.

Dividends have been declared by the following companies:

Housatonic, 4 per cent., semi-annual on the preferred stock, payable July 25.

Delaware & Hudson Canal, 5 per cent., semi-annual, payable August 1.

Minchill & Schuylkill Haven and Little Schuylkill Navigation & Railroad (both leased by the Philadelphia & Reading) 3½ per cent., semi-annual, payable July 16.

Cuyahoga Valley.

The directors have resolved to adopt what is known as the Nimishill route for the line from Canton, O., southward to Bowerstown.

Queen Anne's & Kent.

This road was to be sold under fore closure of the first mortgage at Centerville, Md., July 14. It is 26 miles long, from Massey's Junction, Md., to Centerville.

Iowa Eastern.

Surveys have been made for an extension of this narrow gauge road from Elkader, Ia., to Motor, and an effort will be made to build 20 miles of road this season.

Chicago, Burlington & Quincy.

We hear that this company has hired of the United States' Rolling Stock Company a thousand freight cars in anticipation of the pressure of business in carrying forward the crops, which will probably begin next month.

Minnesota Railroad Law.

The rates of passenger fares purporting to be those adopted by the Railroad Commissioners for the different Minnesota roads were prematurely published. The official schedules have not yet been published. It is stated that the Commissioners are willing to concede to the companies as much as the law will allow, but we understand that the law leaves the

question of the rates entirely to the judgment of the Commissioners as to what is reasonable.

Illinois Central.

The Land Department reports sales for June of 1,122.7 acres construction lands for \$9,301.36 and 120 acres free lands for \$1,490, a total of 1,242.7 acres for \$10,681.36. Cash collections amounted to \$35,011.87.

The Traffic Department reports June earnings as follows:

	In Illinois, 707 miles.	In Iowa, 402 miles.	Total, 1,109 miles.
Freight.....	\$361,802.00	\$77,389.00	\$439,191.00
Passengers.....	103,508.10	41,234.00	144,742.10
Mails.....	9,072.08	3,059.33	12,131.41
Other sources.....	81,427.92	2,236.67	83,664.59
Total.....	\$554,810.10	\$123,918.00	\$678,728.10
Actual earnings, June, 1873.....	\$607,498.27	\$135,101.31	\$742,599.58

This is a decrease of 8 1/2 per cent. in the Illinois earnings, of 8 1/2 per cent. in the Iowa earnings and of 8 1/2 per cent. in the total earnings.

Ticket Offices in New York.

The following is a copy of the circular issued by the trunk lines in New York at the close of last week with the title "General Notice":

"On and after Monday, July 13, 1874, the following will be the only authorized offices in New York City and vicinity for the sale of first and second-class tickets over the following lines:

New York Central and Hudson River.	Erie.
No. 7 Park place.	No. 10 Greenwich street.
No. 413 Broadway.	No. 241 Broadway.
Tenth street and Broadway.	No. 529 Broadway.
Thirty-second st. and Broadway.	No. 937 Broadway.
Grand Central Depot.	Depot foot Chambers street.
Thirtieth street Depot.	Depot foot Twenty-third street.
Brooklyn.	Depot Jersey City.
Hoboken.	Brooklyn.
	Hoboken.
Pennsylvania.	Baltimore & Ohio.
No. 8 Battery place.	No. 315 Broadway.
No. 1 Astor House.	No. 1 Astor House.
No. 526 Broadway.	No. 526 Broadway.
No. 944 Broadway.	No. 944 Broadway.
Depot foot Deabrosses street.	Depot foot Deabrosses street.
Depot foot Cortlandt street.	Depot foot Cortlandt street.
Depot Jersey City.	Depot Jersey City.
Brooklyn.	
Hoboken.	

"All other agents and officers are hereby instructed to render a final report of sales up to and including Saturday, July 11, and return to the undersigned the tickets remaining on hand at that date.

"No commissions, drawbacks or reductions will be allowed or made to any persons or companies whatsoever, at the above authorized ticket offices or elsewhere.

C. H. KENDRICK,
Gen'l Passenger Agent, N. Y. C. and H. R. R.
JOHN N. ABBOTT,
Gen'l Passenger Agent, Erie Railway.
D. M. BOYD, JR.,
Gen'l Passenger Agent, Pennsylvania R. R.
L. M. COLE,
Gen'l Ticket Agent, Baltimore & Ohio R. R."

Montclair.

A meeting of the first-mortgage bondholders was held in New York, July 13. Mr. A. S. Hewitt, one of the trustees, gave a history of the troubles of the road. He said it would require about \$150,000 to put the road in good condition and \$100,000 more to settle claims for right of way. He asked the bondholders to appoint a committee with power to make an assessment which would enable the trustees to pay for the legal expenses and to confer with the second-mortgage bondholders, so as to come to some method of putting affairs in a proper state. Mr. Hewitt stated that the Erie Railroad Company purchased through him, \$100,000 worth of second-mortgage bonds at 60 cents on the dollar. The meeting resolved to appoint the committee, and Messrs. Leonard, C. L. Perkins, James Yearance, De Neufville and G. W. Hassler were appointed.

Arrangements are being made to reopen the road, and it is probable that trains will begin running over its whole length July 20. An injunction has been secured against Mr. Clark, of Watchung, who took up the rails across his property and resumed possession, and the rails have been relaid. It is understood that Mr. Clark will make no opposition if trains are put on the road. The Pratt injunction has never been served on the present holders of the road. It is reported that Mr. Hewitt is willing to complete the road to Greenwood Lake, if he can be guaranteed against loss.

Peachbottom.

Trains are now running on two sections of this road, on the Eastern Division from Oxford, Pa., west to Fulton House, and on the Western Division from York southeast to Dallastown, seven miles. The latter section is new, and tracklaying is still progressing eastward towards the Susquehanna. But eight miles remains yet to be graded on the whole line from York to Oxford.

Marietta & Cincinnati.

Tracklaying has been commenced on the Baltimore Short Line, at the western end. The grading will, it is thought, be completed this month. The Keystone Bridge Company is now putting up the bridge. That across the Little Hocking River (two spans of 110 feet each) has been completed. This is the new line for the eastern end of the Marietta & Cincinnati road, and is being built by that company.

Hanover Junction & Susquehanna.

This company's road is now under construction from York, Pa., eastward to the Susquehanna opposite Marietta and from Marietta to the Reading & Columbia road near Landisville. The two sections are to be connected by a bridge over the Susquehanna. The road will be about 21 miles long. The work now being done consists of some heavy cuts and fills three miles east of Marietta and is nearly finished. Some work has also been done west of the river.

Washington, Cincinnati & St. Louis.

The force at work on the road is to be increased soon, and arrangements are being made for the iron for 30 miles of the road. It is hoped that a section westward from Harrisonburg, Va., will be completed this year.

Green Bay & Minnesota.

An elevator with a capacity of 120,000 bushels of wheat is being built on the east bank of the Mississippi, opposite Winona, Minn. The road is now receiving 15 or 20 car loads of grain daily from the river boats at that point.

Buffalo & Jamestown.

It is stated that the directors have resolved to locate the road south of Gowanda, N. Y., on the original line through Dayton, which will require one grade of 125 feet to the mile.

Lehigh Coal & Navigation.

The Fidelity Insurance & Trust Company, of Philadelphia, gives notice that it has received \$2,058,000 from the sinking fund to be invested in this company's 7 per cent. bonds. The Lehigh & Wilkesbarre Coal Company has paid in \$723,000 of the Lehigh Coal & Navigation Company's convertible gold

bonds in part payment for its purchase of coal lands, which bonds have been canceled.

Houston & Western Narrow-Gauge.

It is said that a contracting firm has offered to build this road, provided the people of Houston, Tex., will subscribe \$75,000. Of this amount \$30,000 has already been raised.

Michigan Central.

The depot of the Grand River Division at Grand Rapids, Mich., was destroyed by fire, July 7, with a large quantity of freight. The loss to the company is stated at \$12,000.

Houston & Texas Central.

This company has just completed at Hearne, Tex., a brick round-house with 12 stalls, which is said to be the finest in the State.

Baltimore & Ohio.

The company has purchased a tract of land at Belpre, O., the terminus of the Marietta & Cincinnati, and will remove there the stock-yards now at Parkersburg, W. Va., on the opposite side of the river. It is reported that the Parkersburg shops will also be moved across the river after a while.

Ogdensburg & Lake Champlain.

The suit to test the validity of the agreement with the Vermont Central trustees came up in the New York Supreme Court, July 10, and arguments were heard but no decision reached.

Burlington & Lamoille.

This company has been fully organized and has asked for a subscription of \$175,000 from the city of Burlington, Vt. The road will be 30 miles long, from Burlington to the Portland & Ogdensburg in Cambridge. Its estimated cost is \$725,000.

The Texas International Suit.

The daily papers have published a telegram to the effect that this company's suit has been decided against it. This is likely to give a false impression as to what was really decided. The suit was brought for a mandamus directing the State officers to issue to the company the bonds promised in the contract with the State, the validity of which has been denied by some of their officers. The Court did not give any opinion as to the validity of the law by which the subsidy was promised or the right of the company to receive it, but simply that the Court has no jurisdiction to issue a mandamus against an executive officer. This seems to leave to the latter full discretion to decide upon the merits of the case. Two of the five judges dissented.

Erie.

English papers publish the following as a copy of telegram from New York, dated June 15, 1874: "The following telegram has been sent by Col. Scott to the London, Asiatic & American Company, Limited: Before Thomson's death I consented to act as director Erie, with satisfactory board. The recent changes cannot take directorship. Beg you to understand importance to all trunk lines that Erie management should be in accord with them. Mr. Jewett's management has hearty concurrence of Mr. King, of the Baltimore & Ohio Railroad, and myself, and will undoubtedly prove satisfactory to the New York Central. This matter is so important to all American railway interest, that they will aid Jewett in perfecting first-class organization for Erie."

Baltimore & Ohio.

On this road blue flags and lights have been adopted as signals for trains to stop for passengers, green signals being used by track and bridge men to indicate that slow speed is necessary.

The Raritan Bridge.

The Central Railroad of New Jersey will erect a wrought-iron pivot bridge, 472 feet long, and s.x fixed spans of 150 feet each, over the Raritan River, at South Amboy. The pivot span will be the largest in the world. The plans proposed by the Keystone Bridge Company have been adopted, and the work will be executed by that company.

Boston & Albany.

Considerable damage was done to the road near Chester, Mass., 28 miles west of Springfield, by the breaking of a dam on the Westfield river. A stone arch bridge at Middlefield switch was carried away with about 200 feet of the road-bed. Another stone bridge and two of wood near Chester were carried away and several others were damaged. It is estimated that \$150,000 will be required to repair the damage. Travel was interrupted for several days.

Panama.

The iron rails now on the road are to be replaced with steel as they wear out, and the necessary steel rails have been purchased.

New Mail Route.

Mail service has been ordered over the Cairo, Arkansas & Texas Division of the St. Louis, Iron Mountain & Southern Railroad. Hereafter Texas and Arkansas letters for Cairo, Louisville, etc., go direct by the way of Poplar Bluff, and not by the roundabout way of St. Louis.

Illinois & St. Louis Bridge.

"The St. Louis Republican says: "It is understood that the principal railroad lines centering in East St. Louis have an understanding not to run their trains across the bridge until all agree to the measure. Yesterday the representatives of these lines, consisting of Gov. Cox of the Toledo & Wabash line, McCullough of the Pennsylvania Company, McKee of the Vandalia line, Blackstone of the Chicago & Alton, and Woodward of the Indianapolis & St. Louis, held a conference at the Southern Hotel, at which it was agreed that they would not run their trains across the bridge until the Union depot was completed."

The Mexican Railway and Mexican Bonds.

The London Financialer says: "We are informed by the Council of Foreign Bondholders that a memorial has received numerous signatures from members of the Stock Exchange, praying the committee not to authorize any more issues of Mexican securities until the Mexican Government has done justice to the bondholders."

This memorial says that the members of the London Stock Exchange express their entire accord with the course pursued by the Council of Foreign Bondholders, the Committee of Mexican Bondholders, and the Committee of the Bourse of Amsterdam, which have agreed to oppose, by all means in their power, the issue on the markets of Europe of any shares or bonds of any railway company or other association formed for the execution of any public work in the Republic of Mexico, until the Government of that Republic shall have liquidated or made a settlement for its debts contracted in Great Britain; and it specifies further that "whereas the Mexican Railway Company is to a considerable extent the property of the Republican Government, and an enterprise over which that Government (according to the various enactments on the subject) has supreme control, and moreover an association which has been, and continues to be, the recipient of a considerable subsidy from the Mexican Government, paid out of revenues specially hypothecated and belonging to the holders of the bonds of the Mexican External Debt—we likewise hereby express our concurrence with the

action of the same bodies in endeavoring to oppose any further issue of bonds of this railway company until the Government of the Republic of Mexico shall have provided for the settlement of the debt as above mentioned. We trust that, in the spirit of the rules and regulations of the London Stock Exchange, no further issue of bonds of the Mexican Railway Company, limited, or of any other company formed for the furtherance of any Mexican enterprise, will be officially sanctioned by you until such settlement shall have been satisfactorily arrived at."

Atchison, Topeka & Santa Fe.

The Land Department reports sales for June of 20,427.83 acres for \$110,210.20, an average of \$5.40 per acre. For the six months ending June 30 the sales were 109,765.63 acres for \$541,631.88, an average of \$4.93 per acre.

Central of Iowa.

A meeting of the bondholders was held in New York, July 8, to take action concerning their interests. The immediate cause of the meeting was the failure of the company to pay the July interest on the certificates in which several years' interest was funded last year. Some of the Boston bondholders have commenced a foreclosure suit, but it is alleged that this action was caused not so much by the condition of the company as by certain appointments made by the officers and board of directors. At the meeting in New York it was resolved to call a meeting at a future date, at which the Boston bondholders should be present, when all matters appertaining to the road should be considered and some joint action decided upon. A committee was appointed to investigate the condition of the company, and report at another meeting.

An adjourned meeting was held July 13, when the committee reported that the company was in a hopeless state of insolvency, and that the sooner affairs were wound up the better. Foreclosure was recommended as the best medium for accomplishing this purpose.

The Iowa Railroad Law.

The Chicago & Northwestern Company has resolved to conform, under protest, to the new law. Mr. Keep, the President, has addressed a letter of protest to the Governor, in which he says that the main line from Clinton to Omaha is leased and has never realized a profit, while the branch lines have not even paid operating expenses.

It is stated that the Chicago, Burlington & Quincy will also conform to the law, but without making a formal protest. The Illinois Central will take no action at present. The Iowa Falls & Sioux City, one of the companies whose line is leased by the Illinois Central, has sued out an injunction to restrain the lessee from working the road at the rates prescribed by the law. The ground of the injunction is that should those rates be enforced the lessor will receive no rental.

Philadelphia & Erie.

A good deal of oil is now received from the Allegheny Valley over the Low Grade Division. June 30, at Driftwood 140 cars were received and 70 more July 2.

A special train with the Superintendent, Mr. Baldwin, and a party on board July 2, left Kane 2:12 p. m. and arrived in Renovo, 5:36, making the run of 101 miles in three hours and 24 minutes, making seven stops. This is pretty good time.

The Wisconsin Railroad Law.

The Attorney General of Wisconsin has filed in the Supreme Court a bill in equity against the Chicago & Northwestern and Milwaukee & St. Paul companies, complaining that they are violating the law and asking that the Court enjoin them to obey the law so far as it was held valid by the recent decision of the United States Court.

In the latter Court it has been agreed by counsel of both parties that the bill filed by the Northwestern bondholders shall be dismissed, and an appeal taken to the Supreme Court.

The Erie International Company, which is building the Erie connection with the International Bridge in Buffalo, has been trying before three commissioners appointed by the Supreme Court the question of the point and manner of crossing the New York Central & Hudson River track. The Commissioners have decided that the Erie could cross the Central tracks of the Junction road either by going over or under them; and that for the right to cross the tracks at Black Rock the Erie Company must pay the Central Company \$35,000, in addition to the expense of constructing and maintaining the crossings, employing flagmen, etc.

The company is having fifty cars built to carry fruit in which have a double casing, the space between the casings being filled with sawdust, like a refrigerator car.

Much complaint is made by employees who have not yet received their pay for May last, in spite of the repeated promises of regular payment made by the company.

The new suits against Jay Gould are to recover \$1,293,000, which is made up in two separate amounts, the first covering moneys expended by him in his transactions in stock of United States Express Company, while President of the company. The second is a claim by the company for reimbursement in money expended to free from incumbrances certain property conveyed by Gould to Erie in the famous restitution transaction in November, 1872. Under the agreement then entered into, Gould agreed to free these properties from the incumbrances to which they were subjected, but has failed to do so, and the action is based on that stipulation.

On the evening of July 10 a fire broke out at the oil docks in Weehawken, opposite New York, which was caused by lightning striking an iron tank. The fire destroyed the extensive oil tanks and sheds in the yard, with the trestles, tracks and a portion of the docks. The company's loss on tanks and buildings is said to be about \$150,000. The oil stored in the tanks was nearly 70,000 barrels, the loss on which falls on the shippers.

Union Pacific.

The petitioners in bankruptcy, who appealed to the Circuit Court from the adverse decision of the United States District Court, have given notice of their withdrawal of the appeal, and all proceedings in the case are consequently at an end.

The Land Department reports for June sales of 43,962.22 acres for \$201,675.33, an average of \$4.58 per acre. The total sales up to June 30 were 1,013,779.36 acres for \$4,619,809.72, an average price being \$4.55 per acre. The principal of land notes outstanding is \$2,638,284.07. Of the \$10,400,000 land-grant bonds issued, the Department has canceled \$1,529,000, and the trustees \$723,000, a total of \$2,252,000, leaving \$8,178,000 still outstanding.

The company recently suddenly raised the freight on coal shipped at Echo and Evanston to Ogden, Utah, from \$1.50 to \$3.80 per ton, no reason for the increase being given. It is alleged that the Union Pacific owns certain valuable coal mines, and desires the monopoly of the coal trade. Its agents are still selling at former rates. No notice was given, and both the Central Pacific and Utah Central Railroad companies refuse to receive their coal at the advanced tariff.

St. Joseph & Denver City.

An agreement has been prepared and submitted to the Eastern Division bondholders, with the statement that it is approved by the majority of the bondholders, and also by the unsecured creditors. It provides that the foreclosure proceedings shall be carried forward and the road sold as soon as possible. J. Augustus Johnson, George J. Forrest and John

J. McCook are constituted a Purchasing Committee, who are to have authority to buy the road and hold it in trust until a new company can be organized and its securities issued. The Purchasing Committee can fill all vacancies in its own number and may appoint one or more members to attend the sale and make the actual purchase. The agreement is not to be in force until signed by holders of \$1,000,000 of bonds, or two-thirds of the whole amount.

As soon as possible after the sale a new company shall be organized by the name of the St. Joseph & Pacific Railroad Company. The new company shall issue stock to the amount of \$900,000, of which \$900,000 is to be issued to present bondholders *pro rata*, and \$90,000 to towns and counties owning old stock. There shall be \$1,900,000 7 per cent. first-mortgage bonds, which are to be exchanged dollar for dollar for outstanding bonds and unpaid coupons, the surplus not required for that purpose to be used for paying taxes and right-of-way judgments. There is to be also an issue of \$1,200,000 second-mortgage 7 per cent. bonds, which are to be used to exchange for the floating debt. Both first and second-mortgage bonds are to bear interest from January 1, 1875, but are to be income bonds until January 1, 1880. Such *pro rata* payment as can be made from the net earnings of the road upon each of the 10 first coupons shall be considered full satisfaction for that coupon, and there can be no foreclosure until after 1880, on these new bonds.

The Eastern Division is 113 miles long, from Elwood, Kan., to Marysville. Should this plan of reorganization be adopted it will have on it \$990,000, or \$8,760 per mile, in stock, and the heavy burden of \$3,100,000 of bonds (\$27,433 per mile), the annual interest charge on which will be \$1,920 per mile, requiring gross earnings of not less than \$6,000 per mile.

Vermont & Canada.

The stockholders met at Bellows Falls, Vt., July 8, and after an animated discussion voted to ratify the agreement for the sale of the road to the Central Vermont Company. The principal questions raised by the opposition were as to the honesty of the purchaser and the ability to pay the interest required. As has been before explained, the sale practically amounts to an exchange by the Vermont & Canada stockholders of their stock for an equal amount of 6 per cent. 30-year bonds secured on their own property, they agreeing to assign to the purchasers all claims for back rent due from the old Vermont Central trustees. It does not look like a very good bargain, but then a long and expensive lawsuit was in prospect, which the sale puts an end to, and it is not easy to predict what decision Vermont courts will reach in a railroad case.

The stockholders of the Central Vermont Company met on the same day at the same place, and also voted to ratify the contract. This may be considered as the first step towards the consolidation of the various properties which the Central Vermont now operates as receiver or as lessee.

The Vermont & Canada road is 49 miles long, from Essex Junction, Vt., northward to Rouse's Point, N. Y., with a branch of eight miles from Swanton, Vt., to the Canada line.

New York & Oswego Midland.

Another meeting of first-mortgage bondholders was held in New York, July 10, at which about \$6,000,000 of bonds were represented. The report of the committee appointed at the previous meeting was presented. It stated that a fund of about \$65,000 should be raised at once to pay rental of leased lines and expenses of engineers to examine the road. There was a sharp discussion on the report and a wide difference of views was shown, which is perhaps due to the fact that many of the first-mortgage bondholders also own second and third-mortgage bonds, and desire to protect all their interests, if possible. It was finally resolved to appoint a new committee, with instructions to employ experts and go over the road to make examination of its condition and means. It is thought that when the present condition of the line is well understood it will be possible to reach some definite conclusion as to a reorganization. It was also resolved that the receivers should test the validity of the taxation of the property in their hands, and that they be empowered to take legal proceedings for that purpose. The old committee was reappointed, with the addition of Messrs. George Opdyke, C. W. Hassler and H. Biennert-hasset.

Baltimore, Pittsburgh & Chicago.

Surveys are to be made for a branch from Bremen, Ind., north by west to South Bend, about 18 miles.

New York & New England.

Application has been made to the Massachusetts Supreme Court by P. B. Goodsell for an injunction to restrain the trustees from transferring the Boston, Hartford & Erie road to the new corporation.

Bridgeton & Port Norris.

A bill has been filed in the New Jersey Court of Chancery to foreclose the mortgage on this road. The Chancellor appointed Hon. A. W. Markley Receiver pending the trial of the case, and he took possession July 9. The road, which was opened late in 1872, is 21 miles long, from Bridgeton, N. J., to Port Norris. The first-mortgage bonds outstanding amount to \$250,000, and the interest for the last six months is unpaid.

Salma, Rome & Dalton.

The foreclosure sale of the section of the road in Georgia has been postponed to September 1, and will take place at Rome, Ga., on that day.

Nevada County.

The surveys have been completed for this narrow-gauge line. The distance from Grass Valley, Cal., to the Central Pacific at Colfax is 16½ miles. The maximum grade will be 106 feet to the mile, and there will be two bridges over Bear River, each about 450 feet long and 70 feet above the stream.

Santa Rosa Branch.

Books for subscription to the stock have been opened in Santa Rosa, Cal., and a committee appointed to confer with the North Pacific Coast Company as to connections, traffic, etc. The road is to connect Santa Rosa with the North Pacific Coast road at Freestone or Valley Ford.

Palisade & Eureka.

Trains have commenced running to the end of the track, 20 miles south of Palisade, Nev. Iron for an additional section of 20 miles is on the way, and tracklaying will be resumed as soon as it arrives.

Southern Pacific.

The end of the road and telegraph line has reached a point 10 miles north of Bakersfield, Cal., and nearly 40 miles south by east from the old terminus at Delano. It was expected that the track would reach the crossing of Kern River some time this week.

Delaware, Lackawanna & Western—Morris & Essex Division.

A question having arisen as to the title to some of the land purchased for right of way for the new tunnel, the company desires to withdraw from its purchase and then secure the land by process of condemnation. A suit is now pending before the Chancellor of New Jersey, which will decide the question. No delay will be caused in the work by this suit, which is mainly formal and intended to prevent possibility of trouble hereafter.

Work on the tunnel is progressing steadily. The New Jersey Midland has given its consent to the crossing of its road

by the tracks of the new line at any time. This will allow the contractor to lay the track from the west of the tunnel out upon the meadows at once, which will be of great assistance to him in removing the debris from the tunnel.

Springfield & Longmeadow.

The City Council of Springfield, Mass., has resolved to submit to the popular vote the question of a city subscription to the stock of this company. The amount is fixed at \$150,000, instead of \$225,000, which the company asked for. The election is to be held July 21.

Lynn & Boston.

An attempt is being made to organize a company to build a new line from Lynn, Mass., to Boston, the Eastern management being unpopular in the former town and a competing road desired. The distance is about 10 miles.

Lewiston & Auburn.

This road, which has been under construction for a year and a half past, is finally completed, and regular trains commenced running over it July 13. It extends from Lewiston, Me., southwest to the Grand Trunk near Danville Junction and is about six miles long. It is to be leased by the Grand Trunk and operated as a branch and will bring that road into direct competition with the Maine Central for the business of the thriving manufacturing towns of Auburn and Lewiston. Most of the stock is held by those two towns.

Peoria, Atlanta & Decatur.

Work has been resumed on this road, and it is reported that the company has secured the money necessary to complete it.

St. Louis, Iron Mountain & Southern.

Surveys have been completed for a branch, which is to leave the main line near Benton, Ark., and run west about 25 miles to the Hot Springs. The Hot Springs are a noted resort, and the travel to the place is quite large.

Cincinnati Southern.

The city of Chattanooga, Tenn., has voted to give \$100,000 in aid of this road.

Flushing & North Side.

The President of this company has told a committee of the people of Huntington, L. I., that the proposed extension to Huntington and Northport will be built at once, provided the people on the line will subscribe a reasonable amount of stock and give the right of way.

A survey has been made for a branch, about four miles long, from the Central road at Farmingdale south to Amityville.

Train Accidents for June.

On the 1st an engine on the Central Railroad of New Jersey was run into the turn-table pit at Phillipsburg, N. J., while the fireman was trying to run it on the table.

On the afternoon of the 1st, as a construction train on the Indianapolis, Bloomington & Western Railway was running backwards near Troutman, Ind., it ran off the track, the locomotive and seven flat cars going down a 30 feet bank and being completely wrecked. The conductor was crushed and the engine and fireman scalded to death. The accident was caused by a laminated rail, which is said to have been crushed down for several feet from the joints, allowing the flange of one of the tender-wheels to take to the top of the rail.

On the evening of the 1st near Vandalia, Ill., on the St. Louis, Vandalia & Terre Haute, an engine with several persons on board was running backwards rapidly, it jumped the track, killing a boy and injuring four men.

On the 3d, as a loaded car was being run down a siding from a mine to the Bingham Canon Railroad near Winamuck, Utah, the brakes gave out and it ran out on the main track and into a passenger train which was standing on the track, wrecking two cars.

On the evening of the 3d, the engine of a train on the Palisade & Eureka road went into the ditch eight miles south of Palisade, Nev. The accident was caused by the sinking of the track, which is new.

On the morning of the 4th, about 4 o'clock, near Naperville, Ill., on the Chicago, Burlington & Quincy Railroad, an extra train east-bound ran into the rear of a regular freight, demolishing several cars and damaging badly the striking engine, whose tender telescoped with the car behind it. There was a dense fog at the time; but the primary cause of the accident is reported to have been neglect to put out proper signals on the regular train, which had stopped by an accident. Its rear brakeman was sent back with torpedoes, but only went back a short distance, fearing to lose his train.

On the 4th a switching engine on the Kookuk and Des Moines Railroad ran into a hand car in the curve in Keokuk, Ia., demolishing the hand car and severely injuring three men who were on it.

On the 4th a car of a freight train jumped the track on the temporary bridge over the Passaic River near Passaic, N. J., on the Erie Railway, blocking the road three hours.

On the night of the 5th the engine of a train on the Virginia & Truckee road was thrown from the track at Steamboat Springs, Nev., by a misplaced switch.

On the evening of the 6th as a Missouri Pacific train was being pushed down Poplar street to the levee in St. Louis, a car jumped the track and ran into the freight house, knocking down some thirty feet of the wall and part of the roof.

On the night of the 6th a train on the Grand Trunk Railway was thrown from the track near Port Colborne, Ont., by running over the dead body of a man which lay upon the track.

Early on the morning of the 7th, a passenger train on the Detroit & Milwaukee road was thrown from the track near Ionia, Mich., at a culvert where a freshet had washed out the road-bed for forty feet. The engine and several cars were wrecked and three persons injured.

On the morning of the 7th a passenger train on the East Tennessee, Virginia & Georgia Railroad was thrown from the track near Rogersville Junction, Tenn., by the breaking of an axle under a sleeping coach. Three passengers were hurt.

On the morning of the 7th, an oil train on the Central Railroad of New Jersey ran into a passenger train which was standing on the track at Plainfield, N. J., damaging the engine and wrecking two cars.

On the night of the 7th, between Lee and Stewart, Ill., on the Chicago & Iowa Railroad, a freight train was wrecked at a place where the road-bed had been washed away in a great storm, and a car loaded with wheat fell into a stream of water. On clearing away the wreck the bodies of two young men were found in the car.

Early on the morning of the 8th an east-bound freight train on the Erie Railway broke in two near Hawthorne, N. J., and a few minutes afterwards another freight train, which was following, ran into the detached section wrecking the caboose and two cars. There was a thick fog at the time.

About six o'clock on the morning of the 8th, as a Newark Branch passenger train was moving up to the platform of the Erie Railway depot, in Paterson, N. J., it ran into the rear of a main-line passenger train which was standing at the depot, damaging the rear car.

A moment afterwards the freight train ran into the rear of the Newark train, damaging the engine somewhat. There was a thick fog at the time which prevented the depot signals from being seen.

On the morning of the 8th, on the Atlanta & Richmond Air Line, at Duluth, Ga., the boiler of the engine of a con-

struction train exploded, killing the fireman and conductor, and injuring the engineman. The engine was standing at the water tank when the explosion took place.

On the afternoon of the 8th, an oil-tank car in a freight train on the Erie Railway exploded when the train was near Greenwood, N. Y., wrecking the car and fatally injuring the conductor.

On the afternoon of the 8th, five cars of a freight train on the New York Central & Hudson River were thrown from the track in Buffalo, N. Y., by a misplaced switch. Three of them rolled down a bank and were badly wrecked.

On the evening of the 8th, an excursion train on the Syracuse & Chenango road was thrown from the track near Let-anon Hollow, N. Y., and one coach went down a bank and upset, injuring 12 persons, besides bruising a large number slightly. The accident is said to have been caused by the overloading of the first coach, which prevented the forward truck from turning on the curve.

On the night of the 8th, near Bowie, Md., on the Baltimore & Potomac road, a freight train ran into a land slide, blocking the road some time.

On the night of the 8th, on the Baltimore & Ohio near Parkersburg, W. Va., a car of a freight train was thrown from the track by a broken wheel.

About 10 o'clock on the night of the 8th, the second section of a freight train on the Pittsburgh, Washington & Baltimore broke in two near Indian Creek, Pa. The rear part of the train ran backwards down a grade and into the head of the third section which was following, wrecking several cars, killing the engineer, and injuring the fireman.

Very early on the morning of the 9th a passenger train on the Louisville & Nashville Railroad ran into the rear of a freight train which was trying to get upon a siding at Belmont, Ky., wrecking an engine and a number of cars and killing the fireman of the passenger. The freight was too long to get the whole train on the siding, and the proper signal had not been displayed.

Early on the morning of the 9th, near Warsaw, Ill., on the Toledo, Peoria & Warsaw road, a small bridge, one abutment of which had been washed out by a freshet, fell under a train, letting the engine down into the creek.

On the afternoon of the 9th, nine empty cars of a train on the Chicago & Northwestern Railway were thrown from the track at the curve on the long trestle near Winona, Minn.

On the night of the 9th at Lafayette, Ind., on the Indianapolis, Cincinnati & Lafayette, a freight train ran over a misplaced switch and into a turn-table, wrecking it completely.

On the morning of the 10th, 13 miles south of Burlington, on the Quincy & Burlington Branch of the Chicago, Burlington & Quincy Railroad, a small wooden bridge broke under a passenger train which was running at the rate of 25 miles an hour. The rear tender wheels went off, and the rest of the train—one coach and a baggage and mail car—fell into the stream. A rail ran nearly half its length through the bottom of the coach and injured two passengers dangerously. It is reported that the ends of the bridge timber were badly rotted.

On the morning of the 10th a freight train on the Winona cut-off of the Chicago & Northwestern ditched seven cars while trying to make a flying switch at Lytle's, Wis.

On the morning of the 10th in Decatur, Ill., there was a butting collision between a freight train and a wild engine on the Toledo, Wabash & Western road, damaging both engines and blocking the road two hours.

On the evening of the 10th the Ulster County express on the New Jersey Midland Railroad ran over a misplaced switch and into some cars which were standing on a siding at Middle-town, N. Y., injuring two men who were at work under one of the cars.

On the afternoon of the 12th a passenger train on the Wilmington & Reading road ran into some cattle which were on the track near Northbrook, Pa., throwing the engine from the track, and blocking the road some hours.

On the night of the 12th 13 cars of a freight train on the Boston & Albany were thrown from the track near Grafton, Mass.

On the night of the 13th a flue blew out on an engine on the Delaware, Lackawanna & Western road near Greene, N. Y., badly scalding the fireman.

On the morning of the 16th a passenger train on the Missouri, Iowa & Nebraska road ran over a cow near Luray, Mo., and the locomotive and baggage car were thrown from the track.

On the afternoon of the 16th a south-bound freight train on the Rome, Watertown & Ogdensburg road broke in two near Evans' Mills, N. Y., and one car jumped the track, blocking the road some hours.

On the night of the 16th an excursion train on the Carolina Central Railroad ran into a break in the track at a culvert, where a flood had washed out the road-bed for some 30 feet, leaving the rails and ties hanging across the break. The engine, tender and four cars were wrecked, the engineman, fireman and two brakemen being killed and eight persons injured.

Very early on the morning of the 17th a freight train on the Michigan Central was thrown from the track at the bridge over Ronkous Creek near Dearborn, Mich., where two rails had been removed from the track, and the engine and 14 cars were wrecked, injuring the engineman. It is believed that the parties who removed the rails had intended to wreck the Atlantic Express, not knowing that the freight was due first.

On the morning of the 17th a car of a freight train on the St. Paul & Pacific was thrown from the track near Darwin, Minn., by a defective wheel, and went down the bank dragging four others after it.

Early on the morning of the 18th an express train on the Indianapolis, Bloomington & Western jumped the track near Indianapolis, Ind., causing some hours' delay.

On the evening of the 18th a car loaded with hay in a local freight train on the Philadelphia & Reading road caught fire near Shoemakersville, Pa. The car was entirely destroyed and the track badly warped, delaying trains some time.

On the night of the 18th, just north of Ottawa, Ill., on the Fox River Branch of the Chicago, Burlington & Quincy Railroad, as a freight train was passing over trestle work, the engine and six cars having passed safely, six cars went over at a switch and blocked the road seven hours.

Very early on the morning of the 19th, four cars of a west-bound freight train on the Chicago, Burlington & Quincy were thrown from the track by a defective switch on a low trestle near Ottawa, Ill., and badly wrecked.

On the 19th, a passenger train on the Walkill Valley Railroad ran over a cow near New Paltz, N. Y., ditching the train and injuring the engineman.

On the afternoon of the 19th, a coal train on the Philadelphia & Reading road was thrown from the track by a broken axle near Auburn, Pa., wrecking 12 cars and blocking the track two hours.

On the 19th, several cars of a train on the Central Pacific were thrown from the track near the depot in Sacramento, Cal., by a defective rail.

On the night of the 19th, a freight train on the Pennsylvania Railroad ran over a cow near Wilmore, Pa., and the engine and 15 cars left the track and went down a bank, killing the engineman and fireman.

About 10 o'clock on the night of the 19th the east-bound Shore Line express on the New York, New Haven & Hartford road struck a rock which had been put upon the track on a bridge near Greenwich, Conn., damaging the front of the engine badly. The preceding Springfield express had struck a rock at the same place, but had thrown it off without damage.

On the morning of the 20th there was a butting collision